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USSR Report

CHEMISTRY

No. 82

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ANALYTICAL CHEMISTRY

UDC 543.544:66 "313"

STATUS AND DEVELOPMENT PROSPECTS OF CHROMATOGRAPHIC ANALYSIS METHODS AT CHEMICAL AND MICROBIOLOGICAL PRODUCTION PLANTS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 11, Nov 81 pp 702-704

SAKODYNSKIY, K. I., ZEL'VENSKIY, V. Yu., GLAZUNOVA, L. D. and
POMAZANOV, V. V.

[Abstract] Other methods of analysis partially obscure the importance of chromatography in both industrial applications and in scientific laboratories, where the Soviet Union seeks to make as much use of the method for analysis as possible. Currently only about 30% of the perceived needs for chromatography are being filled, largely because Soviet industry cannot produce enough equipment, particularly for needs in microbiology. Advances in the technology involving control devices, automatic feedback and computerization only widen the gap. Specific shortages exist for sorbents and calibration equipment, while equipment quality, spare parts and injectors hinder progress. Methodological processing of results is at a low level. Consequently, there is insufficient equipment and expertise for thorough chromatography, and as a rule 80% of the substances can be analyzed only to the point of identifying 10 components. The Ministries of Chemistry and of Microbiology must correct these problems. Figures 3.
[66-12131]

CATALYSIS

UDC 541.128.3

CATALYTIC PROPERTIES OF ZEOLITES IN OXIDATIVE REACTIONS

Moscow USPEKHI KHIMII in Russian Vol 50, No 11, Nov 81 pp 1929-1959

TAGIYEV, D. B. and MINACHEV, Kh. M., Institute of Inorganic and Physical Chemistry, AzSSR Academy of Sciences, Baku; Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] This review outlines the title topic for reactions involving aliphatic, naphthenic, and alkylaromatic hydrocarbons plus some inorganic compounds containing sulfur, oxygen and/or nitrogen (H_2, CO, NH_3, H_2S, ROH, etc.). Consideration is given to the factors, such as structure, type and concentration of exchangeable cations, valence state of transition metals and others, which influence the zeolite's activity and effect on the direction and products of reactions. Adsorption/desorption plays a significant role in zeolite catalysis. The effects of different chemical and structural factors are sufficiently well known to permit the preparation of catalysts for specific industrial applications. Analytical techniques useful in catalysis studies include NMR, infrared spectroscopy and thermal desorption as well as gas chromatography for analyzing multicomponent product mixtures. Figures 5; references 188: 109 Russian, 79 Western. [64-12027]

UDC 542.97

CATALYTIC REACTIONS DURING FORMATION OF AROMATIC HYDROCARBONS BY CYCLOOLIGOMERIZATION OF LOWER OLEFINS AND ALKANES

Moscow USPEKHI KHIMII in Russian Vol 50, No 11, Nov 81 pp 1994-2018

BRAGIN, O. V., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Three general classes of the title reactions are considered in this review. The dehydrocyclodimerization of C-3 to C-5 alkanes and

alkenes occurs at relatively high temperatures, e.g., above about 430°C with catalysts containing both dehydraogenating and acid properties. Common catalysts for this reaction contain the transition metals V, Mo, Cr, W and Mn as well as the species Pt, Al_2O_3, and SiO_2. The acidity of the catalyst generally controls the extent of the reaction. The second type of reaction is the oxidative dehydrocyclodimerization, which occurs not only with alkenes but also with halogen-containing alkanes. Products include various hydrocarbons together with CO and CO_2. The third type of reaction is the dehydrocyclotrimerization of ethylene and ethane in benzene. This reaction is generally carried out over catalysts containing group VIII metals, rhodium, rhenium, irridium and/or palladium. The reaction mechanisms for all three types, especially the third, are rather complex. Figures 9; references 71: 39 Russian, 32 Western (one in English by Bragin, et al.).
[64-12027]

CHEMICAL INDUSTRY

STAGES IN DEVELOPMENT OF 'KARBOLIT' INDUSTRIAL ASSOCIATION

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 81 pp 6-10

VETLOV, A. N., director of "Karbolit" Industrial Association

[Abstract] The name comes from karbolit, the first polymer plastic prepared in 1914 in Dubrovka from the condensation of phenol and formaldehyde. In 1916, industrial production was started. During 1924-1928, hydraulic presses with electrical heaters were installed. During the 1930's, the factory continued to develop due to the requirements of the new automobile, tractor, aviation, metallurgical, and other industries for new materials and components, and attained national significance. Operations were interrupted during World War II, but in 1945 the administration was awarded the Red Banner for increasing the production of chemical products by a factor of 13. In 1945 also, the first acetylcellulose ester was produced. The late 1940's saw strong increase in the number of plastics items manufactured using pressure molding. During the 1950's and 1960's, both the number and the type of products increased, the former due in large measure to automation. During the 1970's, many new projects were started, such as new plants, development of plans for the reconstruction of the entire industry, a new division of solid phenol-formaldehyde resins, new vacuum injection molding and greatly improved efficiency for the production of soluble phenol-formaldehyde resins. Plans for the current five-year plan call for an increase of about 100% of the output.
[153-12027]

'PLASTPOLIMER' OKHTINSKIY SCIENTIFIC-MANUFACTURING ASSOCIATION IN SERVICE OF INDUSTRIAL CHEMISTRY

SAZHIN, B. I., assistant to the general director of "Plastpolimer" ONPO, and YEL'YASHEVICH, A. I., head of the Division of Research-Technological and Economic Information and Propaganda

[Abstract] The "Plastpolimer" ONPO, established in 1969, is a new type of association in which scientific studies are closely coordinated both economically and organizationally with production. This single organization is responsible for research, project planning, start-up, and production

scheduling for the polymerized plastics industry, including materials such as polyolefins and polystyrols. Since 1979, ONPO has also been in charge of such areas as catalytic and initiating systems for polymerization processes. During the 10th Five-Year Plan, the emphasis was on improving the properties of existing materials such as those having physiological applications, rather than the development of new products, although 92 new materials were prepared. The production of thin films and multilayer sheets of polyvinylchloride, poly-4-methylpentenes, and optical grade polystyrols has also received attention. ONPO is the general planner for such chemical giants as the Omsk, the Tomsk, and the Shevchenko chemical plants. At present, ONPO is carrying out projects in conjunction with 15 institutes of the USSR Academy of Sciences, 19 universities, 53 research institutes and construction offices, and 70 commercial enterprises.
[153-12027]

ROLE OF GIPROPLAST IN BUILDING PLASTICS INDUSTRY

Moscow PLASTICHESHIYE MASSY in Russian No 8, Aug 81 pp 14-16

LAVRINENKO, M. N., director of Giproplast

[Abstract] Giproplast is the principal planning institute of the plastics materials branch of the economy. Before 1942, project planning for the plastics industry was handled by such groups as "Soyuzkhimplastmass," "Khimplastmassproyekt," and others. In 1942, individual planning offices were established for the Kuskovo, Orekhovo-Zuyevo and Vladimir factories and the Scientific Research and Project-Planning Institute for Plastics Materials (NIIPM) was established. Due mainly to the planning branch of NIIPM, plastics output increased about 10 fold from 1943 to 1958. In 1958, due to the rapid growth of the plastics industry, the planning branch of NIIPM together with a branch in Vladimir, was transformed into the Giproplast Institute with branches in Vladimir, Leningrad, Rostov-na-Donu, and Novosibirsk. By 1975, the plastics output was 6 times greater than that in 1960, and by 1980, it has again increased 1.7 fold. Large-scale projects involved polyethylene, polystyrol, acetylcellulose, polyester, carbamide, phenol-formaldehyde, vinylacetate and its derivatives, polycarbonate, polyurethane, and others. In addition to project organization, Giproplast also introduced technological designs and equipment designs for a series of continuous processes for carbamides, and phenol-formaldehyde resin, plastic fixation agents, polyvinylacetate dispersions, and others.
[153-12027]

CONTRIBUTION OF 'PLASTMASSY' SCIENTIFIC-INDUSTRIAL ASSOCIATION TO PLASTICS MATERIALS INDUSTRY

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 81 pp 17-19

SERENKOV, V. I., general director of the "Plastmassy" NPO

[Abstract] The Central Experimental Plant (CEP) for plastics was established in 1934, and, in 1936, renamed the Moscow Experimental Plant. In 1943, the latter was used as the facilities for the Scientific Research Institute of Plastics Materials (NIIPM) which in 1975 became the head structural unit of "Plastmassy" NPO. It is one of the oldest and largest centers for the study of the science and technology of polymers and now has branches in Fergana, Cherkassy, Batumi, and Nizhniy Tagil. In 1971, the NIIPM had three departments: NMR spectroscopy, calorimetry, and physical-mechanical evaluation of polymers. During the 10th Five-Year Plan, the institution contributed 11 monographs, over 100 patents, 7 licenses and over 500 scientific articles. Through the interaction of institute personnel with industry, several large-scale processes were developed, including those for phenol-formaldehyde resins for molded articles; carbamide resins; unsaturated polyesters and epoxides; resins based on organosilicon compounds, oligomers of furyl alcohol; plastic fixing agents based on polyester, diester, and organophosphorus compounds; ion-exchange resins and membranes; fluoropolymers, and others. Plastmassy provides the optimum conditions for the rapid implementation of high-technology processes.
[153-12027]

FIRST-BORN IN PROCESSING PLASTICS MATERIALS INDUSTRY IN UKRAINE

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 81 pp 22-24

DROZDOV, Yu. V., director of the "Kharplastmass" Plant, TARAN, A. M., chief economist, and ROMANENKO, V. A., head of Office of Rationalization, Inventions and Technical Information

[Abstract] The first plastics plant in the Ukraine was a celluloid factory started in 1931 at Khar'kov. It was evacuated to Omsk from 1941-1943 during the war, but it resumed production at Khar'kov in 1944. In 1955, a reconstruction stage was started and the factory was used for various processes, such as synthetic resins and molding powders based on celluloid, together with hard rubber resin products and others. In 1965, the reconstruction was complete and a new plant, having an area of 10,000 m^2 and a capacity of 5600 tons was started. During this period, new and larger equipment was obtained and by 1970, 70% was semi- or fully automated. During the 9th and 10th Five-Year Plans, emphasis was placed on upgrading processes and introducing new technology and automation. At the present time, Kharplastmass (as it is named) is one of the most highly mechanized plants, capable of carrying out more than 800 individual processes generating more than 70 named products for agriculture, plastics, alcohols, toys, consumer

goods, and others. The emphasis in the 11th Five-Year Plan is on increased efficiency and production.
[153-12027]

SIGNIFICANCE OF SCIENTIFIC ACTIVITY OF ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF SYNTHETIC RESINS FOR DEVELOPMENT OF PLASTICS MATERIALS INDUSTRY

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 81 pp 30-32

KIYA-OGLU, N. V., director, All-Union Scientific Research Institute of Synthetic Resins (VNIISS)

[Abstract] The title institute (VNIISS) was established in 1957 to provide development of new directions in the areas of polymer chemistry and industrial plastics. Projects included technological processes for preparing polyurethanes, reactive oligomers based on polyalkylene oxides and complex polyesters, and production of cellulose esters (in particular, acetates), semipermeable membranes, thermally-stable resins, penoplast, aromatic polyamides and polyesters (polyarylates). Studies on the kinetics of anion polymerization of alkylene oxides (oligomer + electrolyte + water systems) permitted the development of highly efficient processes for preparing a wide variety of oligomers for polyurethane systems, surface-active compounds, lubricating oils, and improved brake and hydraulic fluids. Important advances were made in the areas of polycondensation mechanisms and the catalytic and stabilization characteristics of different glycols used as additives during the synthesis of complex oligomers, especially polyurethanes. During the 10th Five-Year Plan, the production of urethanes increased 2.1-fold and now over 100 different urethane products are available. Mathematical models were developed for the esterification of cellulose in acetic acid and methylene chloride. The work of the association resulted in a savings of 180 million rubles to the industry, or 5.6 rubles for each ruble invested in VNIISS. Projections for the 11th Five-Year Plan are to increase polyurethanes twofold, simple polyesters by slightly over twofold, cellulose esters 2.5 fold, and foam plastics 1.7 fold.
[153-12027]

RESEARCH WORK OF CENTRAL FACTORY LABORATORY OF KUSKOVO CHEMICAL PLANT

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 81 pp 40-42

ORLOVA, N. V.

[Abstract] The Kuskovo Chemical Plant is one of the oldest plastics enterprises, having celebrated its 100th anniversary in 1980. Its title laboratory is organized into three divisions: physico-chemical, mechanical,

and analytical. It has 120 employees. One of the most difficult problems now being considered is that associated with an industrial process for preparing polyformaldehydes (PF). Advances in this direction include the development of a continuous synthesis for α-polymethylene oxide, the pyrolysis of which generates formaldehyde sufficiently pure to be used in PF synthesis; of a process for increasing thermal stability by blocking the terminal hydroxide groups of PF with acetic anhydride; and of methods to accelerate the manufacturing rate and to better control the properties of the produced PF. In order to improve the properties of block polystyrol, experimental studies were performed and the results expressed as a mathematical model. Improvements continue to be made in the production of polystyrol emulsions, first developed in 1948 on an experimental basis and in 1956 on a commercial basis. Methods for preparing penopolystyrol without a mold and low-viscosity suspensions of polystyrol are also being investigated. Other achievements include development of a synthesis for copolymers of styrol with butyl- and ethylacrylate and for plasticizers based on higher alcohols and phthalic acid; the improvement of the properties of carbamide resins; and the compilation of one of the most extensive technical libraries in the area.
[153-12027]

VINYLACETYLENE FROM WASTE FROM PRODUCTION OF CHLOROPRENE FROM BUTADIENE

Yerevan PROMYSHLENNOST' ARMENII in Russian No 9, Sep 81 pp 25-27

MIRAKYAN, S. M., engineer, and CHUKHADZHYAN, G. A., doctor of chemical sciences and professor

[Abstract] A description is given of a method, developed at the Yerevan Nairit Scientific Production Association Chemical Plant, of producing monovinylacetylene on a small scale from accessible raw material. By the dehydrochlorination of chloroprene and alpha-chloroprene, monovinylacetlyene is produced with a yield of 96 percent, with powdered potassium hydroxide used as the dehydrochlorinating agent and isobutyl alcohol as the medium. Chloroprene and alpha-chloroprene are present in the waste from the production of chloroprene from butadiene. The moist waste contains up to 44 percent chloroprene and alpha-chloroprene, amounting to about 6000 tons per year. The process developed for producing monovinylacetylene from waste also includes the purification of chemically contaminated sewage. The waste material is first dried and then stabilized before being fed to the reactor. A suspension of powdered potassium hydroxide in isobutyl alcohol is first prepared in the reactor, which contains an agitator and heating jacket. The potassium hydroxide is supplied in small portions with the agitator working, in order to avoid lumping. The potassium hydroxide is used in twice the stoichiometric quantity and three- to fivefold more isobutyl alcohol is used than alkali. The reaction takes place at atmospheric pressure at 80°C. The monovinylacetylene produced does not require additional purification and the yield includes 98 percent of the target product with

chloroprene, alpha-chloroprene and monochlorobutene impurities. The yield of monovinylacetylene in terms of chloroprene is 92 percent. In order to recycle the isobutyl alcohol, after the monovinylacetylene has been obtained, water is added to the reaction mass, the mass is filtered after stirring and before removal of the alcohol the reaction mass is neutralized with 30-percent hydrochloric acid to form potassium chloride. After neutralization the mass is subjected to fractional distillation. The first fraction consists of basically organochlorine impurities of the original waste with a 20-percent alcohol content and is burnt off because it is irrecoverable. The second fraction is a mixutre of alcohol and water; this is condensed and separated into two layers in a separator. The bottom aqueous layer is recycled for the purpose of hydrolyzing the potassium alcoholate formed earlier in the process. The top organic layer, consisting of isobutyl alcohol, is sent to be dried. Potassium chloride remaining as a concentrated solution in the still is precipitated by cooling and removed for recycling. The moist isobutyl alcohol is dried by means of azeotropic distillation. After distillation of the entire azeotropic mixture in the still, dry isobutyl alcohol remains, which is recycled for producing monovinylacetylene. References 4 (Russian).
[57-8831]

UDC 66.001.83(100)

25th ANNIVERSARY OF CEMA PERMANENT COMMISSION ON COOPERATION IN CHEMICAL INDUSTRY

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81 pp 3-5

GARBAR, M. I.

[Abstract] The CEMA Permanent Commission on Cooperation in the Chemical Industry, formed by decree at the Seventh Session of the Council for Mutual Economic Assistance (1956) along with other permanent commissions of CEMA, realizes economic and scientific-and-technical cooperation of member countries of CEMA and the Socialist Federated Republic of Yugoslavia in the chemical, pulp-paper and microbiological industries. The participating countries, which include the Peoples Republic of Bulgaria, the Hungarian Peoples Republic, the Socialist Republic of Vietnam, the German Democratic Republic, the Republic of Cuba, the Mongolian Peoples Republic, the Polish Peoples Republic, the Socialist Republic of Rumania, the USSR and the CSSR, have achieved success in economic development over a period of 25 years, utilizing to the maximum their own resources, fraternal mutual assistance and cooperation within CEMA. A complex program for socialist economic integration was adopted in 1971 by the session of the council, having determined the strategy for cooperation for the future. Long-term programs of cooperation were approved at the session of the council in 1978-1979 in the field of energy, fuel and raw materials, machine building, transport communications and production of consumer goods and provisions. Development

of large ethylene plants and cooperative deliveries of ethylene through individual sections of a ring system of ethylene pipelines and counter deliveries of the corresponding chemical materials produced on an olefin base were developed among the large integration facilities and measures. Multiparty agreements on scientific and technical cooperation of interested member countries of CEMA were concluded and have been implemented in the field of developing highly automated production of suspension polyvinyl chloride, developing the design of a methanol production line with capacity of 1,800-2,000 tons per day, development of a unified system for automated design of chemical plants, development of new and improvement of existing methods of extracting butadiene, isobutylene and other hydrocarbons from the C-4 fraction and development of a standard line for filling aerosol tanks. Many types of machines and equipment, transport equipment, consumer goods and individual raw materials are received from the fraternal countries by the Soviet Union and the Soviet Union in turn delivers oil, gas, ore, cotton, lumber and various types of industrial products to the socialist market. The total value of goods received from member countries of CEMA over a five-year period was 90 billion rubles, while the Soviet Union delivered goods worth 98 billion rubles. In celebrating its 25th anniversary, the Permanent Commission of CEMA on Cooperation in the Chemical Industry sees its task as sequential implementation of the basic propositions adopted by the 26th CPSU Congress and by the congresses of other worker and communist parties, the propositions and measures and the complex program and the long-term cooperative programs and fulfillment of the decisions of the council organizations.
[56-6521]

UDC 678.5-462.004

DEVELOPMENT OF PLASTIC PIPE PRODUCTION TO REPLACE METAL PIPE AS IMPORTANT RESERVE FOR SAVING ENERGY RESOURCES

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81 pp 47-50

DAVYDOV, Yu. S., KLIMENKO, V. L., KOCHEROV, N. P. and SHAPIRO, G. I.

[Abstract] The tasks to improve the utilization and saving of raw material, fuel and energy were assigned at the 26th CPSU Congress. The national economy is faced with the job of saving 160-170 million tons of comparison fuel during the current five-year plan. Development of energy-saving equipment and economizing on energy resources directly in production itself and output of chemical materials that contribute to a decrease of the total consumption of energy resources are seen as the optimum methods of accomplishing this goal. Production of plastic pipes and using them to replace traditional steel and cast iron pipes will result in an overall saving of two-thirds per ton of energy resources used. The extent of the saving depends on the replacement coefficient since energy expenditures to produce one ton of pipe from different types of polymers are essentially identical. Replacement of steel pipes of relatively small diameters, up to 114-165 mm,

is seen as the most effective saving. The expenditures of energy resources to produce large-diameter plastic pipe are approximately 20 percent higher than to produce the equivalent quantity of steel pipe. Gradual replacement of metal pipes by plastic pipes will result in the increase of the average saving of energy resources by 1990. References 2 (Russian).
[56-6521]

UDC 665.6:658.272:339.133.017:338.27

SATISFYING NEEDS OF ORGANIC SYNTHESIS INDUSTRY FOR PETROCHEMICAL RAW MATERIAL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 81 pp 29-30

GUBERNSKIY, V. I., KIRPICHEV, V. M., KOGAN, A. I., PROSTOVA, I. V. and YUSHINSKIY, L. T., All-Union Scientific Research and Planning Institute for Petroleum

[Abstract] The basic directions for development of the petrochemical industry were discussed with respect to enlarging the unit capacities of enterprises, installations and plants and combining production processes. The need to intensify production of raw material from existing petroleum refining plants and to construct petrochemical complexes consisting of large petroleum refining enterprises and independent gas-chemical complexes was suggested for production of ethane from casing-head and natural gas. Data are required from the Mnnistry of the Gas Industry and the Ministry of the Petroleum Industry on the possible production volume of ethane and propane from natural gas, gas condensates and gasolines to determine promising and economic types of raw material for pyrolysis. The reduced expenditures per ruble of commercial product were found to vary as a function of expenditures for production of individual types of pyrolysis raw material except directly distilled gasoline, while expenditures to produce this type of raw material were considerably greater with regard to intensifying petroleum refining and were less to refine it in an ethylene plant. The difference in expenditures for refining gas oil is insignificant, whereas the difference between the maximum and minimum total reduced expenditures was 18 percent. The difference between the maximum and minimum total reduced expenditures was 25 percent with different types of pyrolysis raw material.
[78-6521]

CERTAIN TASKS IN DEVELOPING PHYSICOCHEMICAL FOUNDATIONS OF CHEMICAL TECHNOLOGY

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 11, Nov 81 p 642

SLIN'KO, M. G.

[Abstract] Basic research in the area of the physicochemical properties of chemical technology should include such topics as improving the technical level and the economic effectiveness of processes, purification of natural gas and gaseous mixtures, and great advancements in quality control and improvement of industrial catalysts. Bottlenecks must be eliminated, and utilization of resources enhanced. The petrochemical industry in particular needs to find more effective use for all petroleum fractions, so that energy resources can be put to optimal usage. Porous materials involving multiple phases require study in order to develop effective catalysts, carriers and adsorbents. Improved selectivity, durability and activity can bring improved results without increasing capital investments. Polymers need much more sophisticated identification and indications for use than have so far been provided. Uniformity remains a problem. The present issue of this journal is devoted to these problems and to such chemical technology as crystallization, melting and extraction processes.
[66-12131]

COMBUSTION

UDC 552.57

INVESTIGATING KINETICS OF LOW-TEMPERATURE OXIDATION OF DONBASS COAL SUBJECT AND NOT SUBJECT TO SPONTANEOUS COMBUSTION

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 81
(manuscript received 17 Jan 80) pp 3-9

SARANCHUK, V. I., GALUSHKO, L. Ya., PASHCHENKO, L. V. and POTOTSKAYA, L. L.,
Institute of Physical and Organic Chemistry and Coal Chemistry,
Ukrainian SSR Academy of Sciences

[Abstract] The kinetic principles of low-temperature oxidation of pit coal from the Donbass, subject and not subject to spontaneous combustion by atmospheric oxygen, was investigated. The process of oxidation varies as the kinetic indicators vary at temperatures of 60-80°. The effect of the medium, in which coal samples of the metamorphic series are pulverized, on the nature and intensity of the oxidation process, on the content of paramagnetic centers in the coal and on the nature of variation of the content of paramagnetic centers during oxidation was studied in the temperature range of 20-120°. Coal prepared in air contains more paramagnetic centers and interacts more actively with atmospheric oxygen in the first temperature range than coal crushed in nitrogen. The process of oxidation of coal of the entire metamorphic series is affected by the method of preparing the samples. There were not significant differences between coal subject to and not subject to spontaneous combustion in reactivity with respect to atmospheric oxygen, content of paramagnetic centers and composition of functional groups and their variation during oxidation. The intensities of the absorption bands corresponding to ester bonds, phenolhydroxyl groups and C = O of carboxyl groups increase during oxidation up to 80°. The corresponding functional groups accumulate in the coal as a result of oxidation. Figures 3; references 14: 13 Russian, 1 Western.
[59-6521]

UDC 662.749

EFFECT OF FINAL TEMPERATURE OF COAL PYROLYSIS ON REACTIVITY AND NATURE OF INTERACTION OF COKE RESIDUES WITH OXYGEN

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 81
(manuscript received 26 Nov 79) pp 91-95

ROD'KIN, S. P. and ZORIN, A. T. (deceased), Institute of Petroleum and Coal-Chemical Synthesis attached to Irkutsk State University imeni A. A. Zhdanov

[Abstract] The nature and causes of variation in reactivity were determined and refined with respect to oxygen in solid residues used in the range of 623-1,273 K and the relationship of this property to the thermal breakdown of coal and the temperature range of oxygen interaction with the investigated specimens was established. The reactivity of solid residues of cannel coal is essentially constant with respect to oxygen. Reactivity decreases with an increase of pyrolysis temperature to 1,273 K and the decrease is related mainly to variation of the chemical structure of the specimens. A close correlation was established between the rate constant of reaction and the C^a/H^a ratio and temperature corresponding to the maximum rate of reaction. The interaction of oxygen with fragments of the coal structure is the initial phase of oxygen reaction with coal and low-temperature pyrolysis residues. These fragments are released in the form of volatile substances when the coal is heated. The temperature corresponding to the maximum rate of reaction can be used for a relative and rapid estimate of reactivity of carbon-containing substances. Figures 3; references 10: 8 Russian, 2 Western.
[59-6521]

UDC 678.632]32]21:678.027.94

SELF-EXTINGUISHING LAMINATED INSULATION BASED ON PHENOLFORMALDEHYDE RESINS

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81
(manuscript received 3 Mar 80) pp 14-16

ARSEN'YEVA, E. D., AULOVA, N. V., KOZLOVSKAYA, L. A., KONOVALOV, V. V., SAKUNENKO, Yu. I. and SHIROKOV, S. V.

[Abstract] The fire resistance of laminated insulation used by the electrotechnical industry was studied with respect to the structure of phenolformaldehyde oligomers and the nature of a large number of antipyrenes. The use of mineral powdery fillers, such as phosphorus and halogen-containing compounds, as antipyrenes was effective in increasing the fire resistance of laminated insulation. Compounds such as bis-(2,3-dibromopropyloxymethyl)-phosphinic acid, tris-(2,3-dibromopropyl)-phosphate and

trichloropropylphosphate significantly reduces the flammability of laminated insulation. The insulation also had good electrical insulating characteristics. References 8: 3 Russian, 5 Western.
[56-6521]

UDC 678.743.22-19:621.039.83:536

THERMAL BREAKDOWN OF RADIATION-MODIFIED POLYVINYL CHLORIDES

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81 pp 17-18

DAKIN, V. I. and KARPOV, V. L.

[Abstract] The thermal breakdown of radiation-cross-linked polyvinyl chloride and polyfunctional monomer composites was investigated with respect to the qualitative and relative quantitative composition of thermolysis products such as the condensate and nonvolatile residue. The test objects also included irradiated and unirradiated specimens of polyvinyl chloride and polyvinyl chloride and polyfunctional monomer composites. The thermal dehydrochlorination of irradiated composites was characterized by kinetic curves of two types with a high rate of liberation of hydrochloric acid at 220°C and a stepped course related to separation of absorbed radioactive hydrochloric acid. The yield of hydrochloric acid upon thermolysis of unirradiated specimens of polyvinyl chloride was equal to 0.36 g/g of specimen, of polyvinyl chloride + 15 percent diallylsebacynate was 0.28 g/g of specimen and the yield of polyvinyl chloride + 15 percent triallylcyanurate was 0.22 g/g of specimen. These figures were in agreement with formation of chlorine-containing products of thermolysis of polyfunctional monomer in a polyvinyl chloride medium. Figures 2; references 7 (Russian).
[56-6521]

UDC 678.743.22:678.049:536.495

THERMAL BREAKDOWN OF POLYVINYL CHLORIDE IN PRESENCE OF POLYESTER PLASTICIZERS

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81 pp 27-29

MINSKER, K. S., ABDULLIN, M. I., MANUSHIN, V. I., ZHIKHAREVICH, L. B., BARSHTEYN, R. S. and FAZLYYEVA, V. K.

[Abstract] The kinetics of thermal breakdown of polyvinyl chlorides in the presence of polyester plasticizers was investigated. The plasticizing agents were industrial polyesters based on re-esterification of dibutyladipinate by propyleneglycol-1,2, re-esterification of dibutyladipinate by

diethyleneglycol, re-esterification of a mixture of dibutyladipinate and dibutylsebacinate by diethyleneglycol and laboratory specimens of polyethylene plasticizing agents synthesized using various catalysts. The effect of polymer complex ester plasticizers on breakdown of polyvinyl chloride is determined primarily by the presence of free acid impurities and the residues of polyester synthesis catalysts in them. The presence of synthesis catalyst residues in the polyesters must be taken into account when developing formulas for polyvinyl chloride composites using ester-based polymer plasticizers. Figures 2; references 10: 9 Russian, 1 Western.
[56-6521]

UDC 621.3.035.43:537.311:546.16'34'791

SPECIFIC CONDUCTANCE OF MOLTEN LITHIUM AND URANIUM FLUORIDE MIXTURES

Moscow ELEKTROKHIMIYA in Russian Vol 17, No 11, Nov 81
(manuscript received 5 Sep 80) pp 1716-1718

DESYATNIK, V. N., KOVERDA, A. P. and KURBATOV, N. N., Sverdlovsk

[Abstract] The specific conductance of saline melts of lithium and uranium fluorides was investigated over a broad range of temperatures and concentrations by the relative capillary method using an R-568 AC bridge and GZ-56/1 audio oscillator operating at frequency of 50 kHz. The capillary tubes were made of molten polycrystalline magnesium oxide. Eight different compositions with uranium tetrafluoride concentration from 20 to 90 molar percent were investigated. The electric conductivity of uranium tetrafluoride varies intermittently at 1,307 and 1,308 K, which indicates the beginning of crystallization of the melt. The electric conductivity of uranium tetrafluoride increases smoothly with a subsequent temperature increase. The divergence of electric conductivity does not exceed 5 percent of previous experiments conducted in the range of uranium tetrafluoride concentrations up to 60 molar percent. The specific conductance decreases from lithium fluoride to uranium fluoride. Figures 2; references 8: 6 Russian, 2 Western.
[55-6521]

UDC 541.135

USING ELECTROMOTIVE FORCE METHOD TO INVESTIGATE TRANSPORT PROCESSES IN INTERNAL LAYERS OF MEMBRANES CONTAINING VALINOMYCIN

Moscow ELEKTROKHIMIYA in Russian Vol 17, No 11, Nov 81
(manuscript received 12 Aug 80) pp 1628-1632

YURINSKAYA, V. Ye., STEFANOVA, O. K. and MATEROVA, Ye. A., Leningrad State University imeni A. A. Zhdanov

[Abstract] Transport processes in the internal layers of an ion-selective membrane containing valinomycin in equilibrium with potassium chloride and picrate solutions was investigated by the electromotive force method to determine the electrode properties of membranes containing valinomycin. The electromotive force of two galvanic components differing from each other by the possible difference of electrolyte distribution through the membrane was compared using the method of concentration chains. One of the galvanic components includes an ordinary membrane that separates two solutions of different concentration. The membrane in the other component consists of two layers, each of which is first set in equilibrium with the solution coming into contact with it in the component. Membranes containing 0.125 percent valinomycin that show a rather clear anion function provided the most time-stable values of electromotive force. A two-layer membrane containing 0.025 percent valinomycin produced similar results when the electromotive force of the component was measured. The conformity of the values of electromotive force of components with single- and two-layer membranes possibly indicates interphase equilibruum in the systems being investigated. The initial concentration profiles in the surface layer of a single membrane and at the boundary of two layers of a double membrane do not seem to differ strongly. This conformity is seen as the participation of more than two types of particles during electrolyte transfer in the system under consideration. References 6: 5 Russian, 1 Western.
[55-6521]

UDC 541.138

EFFECT OF UO_2^{2+} IONS ON PROPERTIES OF BILAYER LIPID MEMBRANES

Moscow ELEKTROKHIMIYA in Russian Vol 17, No 11, Nov 81
(manuscript received 31 Oct 80) pp 1638-1643

SUKHAREV, S. I., CHERNOMORDIK, L. V., ABIDOR, I. G. and CHIZMADZHEV, Yu. A.,
Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] The effect of uranil ions on phonon conductivity, capacitance, viscoelastic properties, surface tension and surface potentials of bilayer lipid membranes was investigated using azolectin, egg lecithin and phosphatidylserine as the membranes. The viscosity and surface tension of the membranes increased significantly in uranil. There were no significant changes of capacitance and conductivity at low potentials. The surface potential decreases in time while the charge of the trans-side of the membrane remains fixed after the maximum surface potential corresponding to given uranil and electrolyte concentration has been established. Formation of a dense layer having significant dipole moment is dependent on the nature of the membrane and the effect of a decrease of surface potential in time was also found on a phosphatidylserine membrane. A significant surface potential difference that remains unchanged over a period of several hours is established when the same quantity of uranil is introduced to a system containing lecithin membrane. Figures 6; references 9: 3 Russian, 6 Western.
[55-6521]

FERTILIZERS

UDC 661.54(088.8)

CORROSION PROPERTIES AND THERMAL STABILITY OF DEFOLIANT CACS [CYANAMID-CALCIUM NITRATE]

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 81 (manuscript received 19 Feb 80) pp 39-41

DZHAFPAROV, A., SHAMMASOV, R. E. and SEMENOVA. L. N., Chemical Institute, UzSSR Academy of Sciences

[Abstract] CACS defoliant (a mixture of free cyanamid and calcium nitrate) was tested on two steels (St. 3 and steel IXI8H9T), aluminum and duraluminum, formed into rectangular plates, 4-5 cm^2 each. The steel samples were chemically cleaned with ammonia and ammonium citrate, the aluminum and duraluminum plates with 5% HNO_3 solution, then rinsed and heat dried before being immersed in the defoliant. All but "Steel 3" resisted corrosion by the defoliant. The effects of the metals on the defoliant was also tested. Results indicated that the cyanamid calcium nitrate can be shipped ands stored in carbon steel containers coated with an oxidation-resistant lacquer such as "KhSL-350," or polyisobutylene. The unstable cyanamid should also be stored at temperatures below 40°C, according to temperature tests. References 3 (Russian).
[84-12131]

UDC 546.185 + 325 -- 126.541.1

THERMOPHYSICAL CHARACTERISTICS OF SULFOPOLYPHOSPHORIC ACIDS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 81 (manuscript received 27 Apr 81) pp 61-63

ARIFDZHANOV, S. M., SMIRNOVA, Ye. P. and NAMAZOV, Sh. S., Chemical Institute, UzSSR Academy of Sciences; Scientific Research Institute for Fertilizers and Insectofungicides imeni Professor Ya. V. Samoylov

[Abstract] Thermal capacity and heat and temperature conductivity coefficients were determined for sulfopolyphosphoric acids used in

fertilizers, employing a quasistationary method and a differential thermocouple. Results for sulfopolyphosphoric acids of varying compositions are presented in tabular form. Figures 4; references 8 (Russian).
[84-12131]

UDC 622.765:546.791

ION FLOTATION AS METHOD OF CONCENTRATING DILUTED SULPHURIC ACID SOLUTIONS OF URANIUM

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 9, Sep 81
(manuscript received 4 Sep 80) pp 1982-1985

SKRYLEV, L. D. and MENCHUK, V. V.

[Abstract] The possibility of flotation separation of uranium from dilute sulphuric acid solutions was investigated by using alkyl pyridine chlorides containing decyl, dodecyl, tridecyl, tetradecyl, pentadecyl and hexadecyl radical, alkylamide bromides of nicotinic acid with the alkyl radical, hexadecylbenzyldimethyl ammonium bromide and also biquaternary ammonium salts of N,N'- derivatives of hexamethylene- and ethylenediamine. The maximum degree of flotation separation of uranium occurred at pH values of 2-4 using hexadecylpropyridine chloride and {1,2-[N,N'-bis(dimethyl)-N,N'-bis(decylacetate)]ethylenediamonnium} dichloride. The degree of flotation separation increases slightly when the temperature of the solutions is increased from 20 to 50°, when the tetra- and pentadecyl radicals were used as the collector. The degree of flotation separation decreases with an increase of temperature of the solution when the hexadecyl radical and ethonium are used as the collector. A total of 99 percent of the uranium is separated from the solutions under experimental conditions. Figures 3; references 10: 7 Russian, 3 Western.
[16-6521]

UDC 541.127: 622.765:546.791

KINETICS OF FLOTATION SEPARATION OF URANIUM FROM DILUTE CARBONATE SOLUTIONS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 9, Sep 81
(manuscript received 10 Nov 80) pp 2137-2140

SKRYLEV, L. D., LEGENCHENKO, I. A., MENCHUK, V. V. and KONDRAT'YEVA, S. S.

[Abstract] The kinetics of flotation separation of uranium from its dilute carbonate solutions using diheptylamine was investigated. The kinetics of

flotation separation of uranium-containing complex anions using diheptylamine is described by an equation similar to a second-order reaction equation. Theoretical substantiation of this equation is provided and is based on the assumption that the limiting stage of the sublate foam formation process on the surface of the solution is laminar coagulation of the sublate particles. This occurs due to a sharp increase of concentration in the thin layer of foam formed on the surface of the solution during flotation. Figures 3; references 8: 5 Russian, 3 Western.
[16-6521]

NITROGEN COMPOUNDS

UDC 542.943:541.515:542.952.1:547.491

OXIDATIVE RADICAL REARRANGEMENT OF CYCLOALKANONE CYANOHYDRINS WITH 1,4-, 1,5- and 1,6-MIGRATION OF CYANO GROUP

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 12, Dec 81 (manuscript received 30 Apr 81) pp 2755-2761

OGIBIN, Yu. N., VELIBEKOVA, D. S., KATSIN, M. I., TROYANSKIY, E. I. and NIKISHIN, G. I., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences

[Abstract] Effect of the ring size, and of substituents in position 2, on the direction of oxidation and its rate was studied in the system $S_2O_8^{=}$ - Ag^+, using cyanohydrins of cyclopentanone (I), 2-methylcyclopentaone (II), cyclohexanone (III), 2-methylcyclohexanone (IV) and cycloheptanone (V). None of the e cyclic cyanohydrins reacted in weakly acidic aqueous solutions at 60°C; no reaction was observed even in presence of Ag^+ or $S_2O_8^{=}$ alone. Only in presence of both $S_2O_8^{=}$ and Ag^+ did the reaction take place leading to the conclusion that the reaction with $S_2O_8^{=}$ is catalyzed by Ag^+. Tertiary butanol was used as the standard for comparative purposes. All compounds studied showed higher reactivity than tert-BuOH, the methylated analogues being more reactive than the parent compounds. Specifically I and II isomerized with opening of the cyclopentanone ring and a 1,5-migration of the cyano group yielding 5-cyanopentanoic and hexanoic acids; III and IV exhibited a 1,6-migration of the cyano group yielding 6-cyanoheptanoic acid and V was converted to 4-cyanocycloheptanone. References 17: 8 Russian, 9 Western.
[81-7813]

UDC 542.91:547.796.1

SYNTHESIS OF TETRAZOLS FROM HALOGEN MALONONITRILES AND ORGANIC AZIDES UNDER HIGH PRESSURES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 12, Dec 81 (manuscript received 26 Jan 81) pp 2764-2767

KRAYUSHKIN, M. M., YAROVENKO, V. N., LUK'YANOV, O. A. and ZHULIN, V. M., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] In order to increase the ability of nitriles to form tetrazols at high pressures, it is necessary to modify them with suitable substituents which could be removed after the reaction. In the present paper, synthesis of tetrazols using halogenated malononitriles is described. After completion of the reaction, the activating group, the halogen atom, is eliminated. It was shown that dinitriles of dibromo- and dichloromalonic acid (I) react with equimolar quantities of benzyl azide under 10 kBar pressure and 60°C to form di-X-cyano[5-(benzyl-tetrazolyl)]methanes (X = Cl or Br). Reaction of chlorinated I with phenylazide required higher temperature; at 100°C it too yielded dichlorocyano[5-(1-phenyltetrazolyl)]-methane (II). At 100°C, chlorinated I reacted with benzylazide to yield dichloro-di[5-(1-benzyltetrazolyl)]methane; the bromoderivative proved to be unstable under these conditions. Benzylazide did react with II at 110° yielding dichloro[5-(1-benzyltetrazolyl], [5-(1-phenyltetrazolyl)]methane. Treatment with sodium borohydride reduced the halides. References 4 (Russian).
[81-7813]

UDC 542.91:547.1'118

REACTION OF ACYL(AROYL)ISOCYANATES WITH DIMEDONE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 12, Dec 81 (manuscript received 13 Apr 81) pp 2788-2790

ARBUZOV, B. A., ZOBOVA, N. N. and DAUTOVA, L. A., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] It was shown that reaction of trichloroacetyl (I), trifluoroacetyl (II) and benzoyl (III) isocyanates with dimedone (IV) depends on temperature and on the type of isocyanate used. At 18-20°C I reacts with IV to form N-trichloroacetyl-O-(5,5-dimethyl-3-oxo-1-cyclohexen-1-yl) carbonate, m.p. 84°C. Heating this reaction mixture to 65-75°C favors a [4 + 2]-cycloaddition leading to the formation of 10,10-dimethyl-4,8-dioxo-2-trichloromethyl-1,5,3-dioxazaspiro-[5,5]-undec-]-ene (V), m.p. 137-139°C. The principal products of the reaction of II with IV are

5,5-dimethyl-1-hydroxy-3-trifluoroacetimino-1-cyclohexene and 5,5-dimethyl-3-oxo-1-trifluoroacetamido-1-cyclohexene. The reaction of III with IV gave two products from which one was tentatively identified with V on the basis of IR and PMR spectra. References 3: 2 Russian, 1 Western.
[81-7813]

ORGANOMETALLIC COMPOUNDS

UDC 539.1+539.2+542.42

STRUCTURE AND ELECTRIC FIELD GRADIENT IN COMPOUNDS OF TIN (IV) HALOGENIDES WITH ORGANOPHOSPHORUS LIGANDS

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 22, No 5, Sep-Oct 81
(manuscript received 17 Apr 80) pp 28-31

BASHKIROV, Sh. Sh., DOBRYAKOV, I. A., ROMANOV, Ye. S. and KHRAMOV, A. S.,
Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Mössbauer spectroscopy was employed on four compounds of tin (IV) halogenides with organophosphorus ligands ($([R'R''R'''P(O)]_2SnR_nX_{4-n}$; n = 0, 1, 2), to obtain the sign of the electric field gradient, which is predicated on the distribution symmetry of electron density in the vicinity of the resonant nucleus. The electric field gradient was found to be negative, thereby indicating an excess of $5p_z$ electrons and the fact that the major axis of the electric field gradient is directed along the (CH_3)-Sn-Cl or the (CH_3)-Sn-(CH_3) bond. The values for ΔE (+ 0.67 to + 4.26) suggest that the angles of the C-Sn-Cl, C-Sn-O, and Cl-Sn-O are close to 90° in these octahedral structures. Figures 2; references 18: 6 Western, 12 Russian.
[75-12172]

ORGANOPHOSPHORUS COMPOUNDS

UDC 546.65:547.491.5'268.6

COORDINATION THIO- AND SELENOCYANATES OF LANTHANIDES WITH OCTAMETHYLDIPHOSPHORAMIDE

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 81 (manuscript received 26 Feb 81) pp 54-56

SKOPENKO, V. V., corresponding member, UkSSR Academy of Sciences, TRYASHIN, A. S., TKACHENKO, K. V. and KLYUCHKO, S. V., Kiev State University

[Abstract] The interaction of thio- and selenocyanates of lanthanides with octamethyldiphosphoramide was studied as a continuation of investigating pseudo-halogen complexes of lanthanides with bisphosphoryl ligands. Lanthanide nitrates and potassium thiocyanate were used as the initial reagents. The coordination compounds were separated from acetone solutions and lanthanide thio- or selenocyanate was produced by an exchange reaction between the lanthanide nitrate and the potassium pseudo-halogen in solution. The compounds were analyzed for metal and phosphorus content. The selenium in selenocyanate compounds was determined by the weighing method after decomposition of sulphuric acid; the selenium in the thiocyanate compounds was determined argentometrically. The coordination formula of dimer thiocyanate compounds can be represented as $[\mathrm{Ln(octamethyldiphosphoramide)_3(NCS)_2}][\mathrm{Ln(octamethyldiphosphoramide)_2(NCS)_4}]$, as confirmed by infrared spectroscopy. References 4: 1 Russian, 3 Western.
[22-6521]

UDC 541.64:547.241

OLIGOMERIC ORGANOXYPHOSPHAZENES

Moscow USPEKHI KHIMII in Russian Vol 50, No 12, Dec 81 pp 2270-2299

KIREYEV, V. V., ASTRINA, V. I. and CHERNYSHEV, Ye. A., Moscow Institute of Chemical Technology imeni D. I. Mendeleyev

[Abstract] A review of Soviet and Western literature is provided, which deals with preparation, properties, and use of the linear, cyclic, and

non-cyclic alkoxy- and aryloxyphosphazenes. Recent years in particular have seen their application in the synthesis of thermostable, nonflammable, highly elastic solid and liquid materials with excellent mechanical and dielectric properties, as well as a high degree of chemical and radiation resistance. Tables 6; figures 3; references 164: 5 Polish, 56 Russian, 103 Western.
[74-12172]

UDC 547.539.151;547.538.2;543.422.5

COMPARATIVE STUDIES ON ELECTRONIC STRUCTURE OF TERTIARY ARYL(ARYLETHINYL)-PHOSPHINES (ARYL-C_6H_5, C_6F_5) AND THEIR REACTIVITY WITH TETRACYANETHYLENE

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: KHIMICHESKIKH NAUK in Russian No 14, Issue 6, Nov 81 (manuscript received 25 May 81) pp 119-127

KRUPODER, S. A., DOLENKO, G. N., FURIN, G. G., ANDREYEVSKAYA, O. I. and YAKOBSON, G. G., Novosibirsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] X-ray fluorescent spectroscppy was employed in studies on the electronic structure of tertiary aryl(arylethynyl)phosphines containing phenyl and pentafluorophenyl groups as the aryl substituents, in order to determine the effects of the aryl group on the intramolecular interactions in such compounds and on their reactivity with tetracyanoethylene, leading to the formation of charge-transfer complexes. Since the former are weak bases and the latter a weak acid, the reactivity was determined in terms of the energy changes and locatization of the highest-occupied molecular orbitals and the charge on the phosphorus atom of the phosphines. Evaluation of the data showed that the over-all electron acceptor effect of the substituents could be ranked as follows: $C_6H_5 < C_6F_5 < C_6H_5C \equiv C \sim C_6F_5C \equiv C$.

Furthermore, the electron acceptor effects of the phosphorus atom-bound substituents can readily be evaluated from their relative contribution to the positive charge on the phosphorus atom, which revealed a series identical to the one above. The first ionization potentials of phosphines are presented in a tabular form. Tables 4; figures 1; references 31: 1 Czech, 13 Russian, 17 Western.
[76-12172]

UDC 548.737

STRUCTURE OF ORGANOPHOSPHORUS COMPOUNDS, PART 19: X-RAY STRUCTURAL AND SPECTRAL STUDIES ON O-DIMETHYLPHOSPHORYLBENZOIC ACID

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 22, No 5, Sep-Oct 81 (manuscript received 18 Jun 80) pp 100-104

ANTIPIN, M Yu., STRUCHKOV, Yu. T., MATROSOV, Ye. I., BONDARENKO, N. A., TSVETKOV, Ye. N. and KABACHNIK, M. I., Institute of Hetero-Organic Compounds; Institute of Physiologically Active Substances, USSR Academy of Sciences

[Abstract] X-ray structural studies and IR spectroscopy were conducted on o-dimethylphosphorylbenzoic acid to determine the effects on the H bonds of the rigidity of the fragment binding the phosphoryl and hydroxyl groups of the molecule. Evaluation of the intermolecular H bonds along b axis, involving O atoms of the phosphoryl group (P = O, 1.498 Å) and the OH group (C - OH, 1.313 Å), yielded an OHO angle of 175° and interatomic distances of 0.87 Å for O - H, and 1.70 Å for H...O. Bond lengths for P - C(Me), P - C(Ph), and C(Ph) - COOH were established at 1.785, 1.883, and 1.494 Å, respectively. The key P and C atoms of the o-substituents deviated from the mean plane of the ring by 0.0027 and 0.117 Å, respectively, while the carboxyl group forms an angle of 14.6°. The IR spectra of the intermolecular H bonds revelaed three absorption bands (2800, 2500, 1900 cm^{-1}) which are characteristic of C(O)OH...O = P type of H bonds, as well as a low frequency shift of phosphoryl group vibration, $\Delta\nu_{PO} = 50\ cm^{-1}$. Figures 1; references 19: 8 Russian, 11 Western.
[75-12172]

UDC 548.737

STRUCTURE OF ORGANOPHOSPHORUS COMPOUNDS, PART 20: CRYSTALLINE AND MOLECULAR STRUCTURE OF DIETHYL-m-NITROPHENYLAZOPHOSPHONATE AT ROOM (20°) AND LOW (-120°) TEMPERATURES

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 22, No 5, Sep-Oct 81 (manuscript received 18 Jun 80) pp 105-110

ANTIPIN, M. Yu., STRUCHKOV, Yu. T., LEVIN, Ya. A. and VALEYEVA, T. G., Institute of Hetero-Organic Compounds, USSR Academy of Sciences; Institute

[Abstract] X-ray structural analysis of diethyl-m-nitrophenylazophosphonate ($m\text{-}NO_2C_6H_4\text{-}N{=}NP(O)(OC_2H_5)_2$) at 20° and -120°C yielded parameters expected for this class of compounds, and indicated that the azophosphonate group in the triclinic crystals is in the trans configuration. Difficulties with the geometric parameters of the ethoxy group were due to disorganization at 20°; at low temperatures, however, randomization was markedly attenuated and

limited in the case of one of the terminal carbon atoms, C(4), to two equally-probable positions. Figures 1; references 10: 4 Russian, 6 Western. [75-12172]

UDC 542.91:547.1'118

REACTION OF 2,4,6-TRIISOPROPYL-1,3,5-DIOXAPHOSPHORINANE AND ITS SULFIDE WITH CHLORAL AND p-FLUOROBENZALDEHYDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12, Dec 81 (manuscript received 4 May 81) pp 2776-2780

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[Abstract] Reactions of 2,4,6-triisopropyl-1,3,5-dioxaphosphorinane (I) and its sulfide (II) with chloral, p-fluorobenzaldehyde and CH_3CHO were studied. With CH_3CHO, I and II gave hydroxyethyl derivatives from which only the product of II was stable: 5-(1'-hydroxyethyl)-5-thio-2,4,6-triisopropyl-1,3,5-dioxaphosphorinane, m.p. 38°C. With chloral both I and II yielded the oxidation product 5-(2',2',2'-trichloro-1'-hydroxyethyl)-5-oxo-2,4,6-triisopropyl-1,3,5-dioxaphosphorinane, m.p. 137°C. With p-fluorobenzaldehyde I yielded 5-(1'-p-fluorophenyl-1'-hydroxymethyl)-5-oxo-2,4,6-triisopropyl-1,3,5-dioxaphosphorinane, m.p. 110°C. References 9: 4 Russian, 5 Western.
[81-7813]

UDC 542.91:547.1'118

REACTION OF PHOSPHORUS ACID CHLORIDES WITH DIPHENYLUREA

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12, Dec 81 (manuscript received 29 Apr 81) pp 2796-2800

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[Abstract] Reaction of alkylphosphorous acid dichlorides with diphenylurea (DPU) in presence of triethylamine yields 2-alkoxy-4-oxo-1,3-diphenyl-1,3-diaza-2-phosphatidin-4-ones. With phenylphosphonous acid dichlorides, DPU appears to form 2-phenyl-4-oxo-1,3-diphenyl-1,3-diaza-2-phosphatidin-4-one. No individual products could be isolated from reaction of PCl_3 with DPU. Diethylphosphonic acid chloride reacts with DPU in presence of pyridine forming tetraethylpyrophosphate and diphenylcarbodiimide. References 9: 4 Russian (1 by Western author), 5 Western.
[81-7813]

UDC 542.91:547.1'118

REACTION OF HYPOPHOSPHOROUS ACID WITH BENZALDEHYDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 12, Dec 81 (manuscript received 4 May 81) pp 2803-2806

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[Abstract] Because of contradictory results reported in literature, reaction of hypophosphorous acid with benzaldehyde was reinvestigated varying the ratio of reagents and using NMR ^{31}P spectroscopy in analysis of products. It was established that the reaction products consisted of bis(α-hydroxy-benzyl)phosphinic acid and 5-hydroxy-5-oxo-2,4,6-triphenyl-1,3,5-dioxaphosphorinane. Figures 1; references 7: 3 Russian, 4 Western.
[81-7813]

UDC 542.91:547.1'118

SYNTHESIS OF CERTAIN N-SUBSTITUTED β-AMINOETHYL ESTERS OF α-HYDROXYPHOSPHINIC ACIDS AND THEIR METHYL IODIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 12, Dec 81 (manuscript received 30 Jun 81) pp 2824-2828

GODOVIKOV, N. N., KARDANOV, N. A., CHEPAYKINA, T. A. and KABACHNIK, M. I.,
Institute of Hetero-Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Reaction of potassium or triethylammonium salts of alkyl- or aryl-α-hydroxyalkylphosphinic acids with N,N-disubstituted β-chloroethylamines gave a series of N-substituted aminoethyl esters of α-hydroxyphosphinic acids and their methyl iodides. Alkylation of α-hydroxyphosphinic acids with N,N-dimethyl and N,N-diethyl-β-chloroethylamines was not possible under these conditions because of intermolecular alkylation. References 11: 7 Russian, 4 Western.
[81-7813]

UDC 543.422 : 541.6 : 547.1'118

SPECTRA AND CONFORMATIONS OF MOLECULES OF 1,3,2-DIOXAPHOSPHORINANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 11, Nov 81 (manuscript received 8 Jan 81) pp 2505-2507

SHAGIDULLIN, R. R., SHAKIROV, I. Kh., MUSYAKAYEVA, R. Kh., VANDYUKOVA, I. I., KATSYUBA, S, A., NURETDINOV, I. A. and MATROSOV, Ye. I., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, USSR Academy of Sciences; Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The results are given of a theoretical and experimental study of the infrared and Raman vibrational spectra of molecules of 1,3,2-dioxaphosphorinanes, showing that these molecules exhibit conformational inhomogeneity in the liquid state and in solutions. In the transition from crystal to melt (solution) some bands become doublets for all the compounds studied, and these changes are reversible. The relative intensities of the high-frequency components of these doublets increase with an increase in polarity of the solvent in order CCl_4, C_6H_6, $CHCl_3$ and CH_3CN. Ir spectra were measured with a UR-20 spectrometer and Raman spectra with a Coderg PHO laser spectrometer and cryostats were used to obtain low-temperature spectra. The vibrational spectra show that 2-X-2-methyl-1,3,2-dioxaphosphorinanes, where X = 0, S, Se, exist in the liquid phase as a thermodynamic equilibrium state between two chair forms with axial (a) and equatorial (e) orientation of the P=X multiple bond. The medium has a strong influence on the conformation of molecules of these compounds. Changes in the difference in enthalpies of the a- and e-forms were computed and were shown to agree with values determined experimentally. The reactive field theory is enlisted to explain changes in conformational equilibruum. Strong interaction between molecules and the medium in the liquid phase results in the fact that the difference in enthalpies of conformers depends on the temperature of the medium. Temperature corrections are computed for experimentally determined values of this difference in enthalpies.
References 4: 3 Russian, 1 Western.
[62-8831]

UDC 542.91 : 547.1'118'161

PERFLUOROISOPROPYLIDENE AND PERFLUOROISOPROPENYL DERIVATIVES OF PHOSPHORUS, PART 1: SYNTHESIS OF ALKYL PERFLUOROISOPROPENYL PHOSPHONATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 11, Nov 81 (manuscript received 22 Apr 81) pp 2583-2589

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[Abstract] A description is given of the synthesis and a study is made of the properties of derivatives of pentafluoroisopropenyl phosphonic acid.

Pentafluoroisopropenyl phosphonates are produced by dehydrofluorination of individual alpha-hydrohexafluoroisopropyl phosphonates or by splitting out the alkyl fluoride from hexafluoroisopropylidene trialkoxy phosphoranes under the effect of the $Et_3N \cdot BF_3$ adduct. Hexafluoroisopropylidene trialkoxy phosphoranes (III) are capable both of being alkylated and of emerging as alkylators. These compounds also easily yield the F^- anion under the effect of the Lewis acid BF_3. The alkyl fluorides can be split off from compound III and they can be regrouped both through an electrophilic and nucleophilic mechanism. Under the effect of catalytic amounts of $EtO \cdot BF_3$ hexafluoroisopropylidene trimethoxy phosphorane is regrouped into the dimethyl ether of alpha-methylhexafluoroisopropyl phosphonic acid and the analogous triethoxy phosphorane splits off the ethyl fluoride, being transformed into the diethyl ether of pentafluoroisopropenyl phosphonic acid. Unstable adducts of the $[CF_2 \overset{\cdot\cdot\cdot}{-} C(CF_3) \cdot\overset{\cdot}{-}\cdot P(OR)_3]^+BF_4^-$ type are formed as intermediate stages. NMR spectra were recorded with a Perkin-Elmer R-32 instrument and ^{31}P spectra with a Bruker HX-90. Mass spectra were recorded with a Varian MAT CH-8 spectrometer. Complete data are given on the dimethyl ether of pentafluoroisopropenyl phosphonic acid, the diethyl ether of this acid, on the influence of admixtures on the rate of splitting of the alkyl fluoride from hexafluoroisopropylidene trialkoxy phosphoranes under the influence of the $Et_3N \cdot BF_3$ adduct, on the diethyl ether of alpha-hydrohexafluoroisopropyl phosphonic acid, the adduct of the diethyl ether of pentafluoroisopropenyl phosphonic acid with BF_3, the interaction of hexafluoroisopropylidene trimethoxy phosphorane with $EtO \cdot BF_3$, the interaction of hexafluoroisopropylidene triethoxy phosphorane with $EtO \cdot BF_3$, the interaction between hexafluoroisopropylidene triethoxy phosphorane and the adduct of the diethyl ether of pentafluoroisopropenyl phosphonic acid with BF_3, the dimethyl ether of alpha-methylhexafluoroisopropyl phosphonic acid, and the interaction of hexafluoroisopropylidene trimethoxy phosphorane with Et_3N. References 9: 7 Russian, 2 Western.
[62-8831]

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UDC 542.91:541.69:547.1'118

ANTICHOLINESTERASE PROPERTIES OF METHYL-(ω-ALKOXYALKOXY)PHOSPHORYLOXYLUPINANES, N-[METHYL-(ω-ALKOXYALKOXY)PHOSPHORYLOXYETHYL] ANABASINES AND THEIR IODOMETHYLATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 11, Nov 81 (manuscript received 5 Feb 81) pp 2606-2609

ABDUVAKHABOV, A. A., KHOLBEKOV, O. Kh., AUYELBEKOV, S. A. and GODOVIKOV, N. N., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent

[Abstract] The results are given of an experimental study of the anticholinesterase activity of methyl-(ω-alkoxyalkoxy)phosphoryloxylupinanes (I)

and their iodomethylates (II) and of N-[methyl-(ω-alkoxyalkoxy)phosphoryloxyethyl] anabasines (III) and their iodomethylates (IV). The synthesis of inhibitors of cholinesterase was described in an earlier study (Godovikov, N. N., et al., 1974). Partly purified preparations of butyrylcholinesterase from equine blood serum with specific activity of 8.0 units/mg produced by the Moscow Scientific Research Institute of Vaccines and Serums imeni I. I. Mechnikov and acetylcholinesterase from human erythrocytes produced by the Perm' Scientific Research Institute of Vaccines and Serums with a specific activity of 2.3 units/mg were used in order to determine anticholinesterase activity. Acetylcholine chloride was used as the substrate. Anticholinesterase activity was evaluated by the values of equilibrium inhibitor constants, K_i, determined by the graphic method. Potentiometric titration was employed to determine the residual activity of the enzyme. Anticholinesterase activity was measured at 25°C in a $2\cdot10^{-3}$ M phosphate buffer in the presence of $2\cdot10^{-2}$ M KCl with an anticholinesterase concentration of 0.2 mg/ml. The concentration of the substrate was varied over a range of $0.5\cdot10^{-4}$ to $1\cdot10^{-3}$ M. The activity of butyrylcholinesterase was determined under similar conditions with a pH of 7.5 and a butyrylcholinesterase concentration of 0.025 mg/ml with the concentration of the substrate varied over a range of $0.5\cdot10^{-3}$ to $1\cdot10^{-2}$ M. Inhibitor solutions were prepared in ethanol diluted with water to an ethanol content of not greater than 2 percent. The concentration of anticholinesterase varied over a range of $1\cdot10^{-5}$ to $6\cdot10^{-4}$ M and of butyrylcholinesterase $1\cdot10^{-5}$ to $4\cdot10^{-4}$ M. Curves indicating the dependence of the value of inhibitor constant on the distance between oxygen atoms in the alkoxy group of compounds I to IV are used to demonstrate that the compounds studied are reversible inhibitors whose activity depends on the presence and position of the hydrophilic oxygen atom in the alkoxy group. The reversible inhibitor activity of organic phosphorus inhibitors depends on their ability to be sorbed onto the active surface of the enzyme on account of hydrophobic interaction. Figures 2; references 4 Russian.
[62-8831]

UDC 542.91 : 541.49 : 547.1'118

SYNTHESIS OF TRIALKOXYPHOSPHONIUM YLIDES BY INTERACTION OF FLUORINATED ALPHA-OXIDES WITH TRIALKYL PHOSPHITE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 11, Nov 81 (manuscript received 8 Jul 81) p 2653

KADYROV, A. A., ROKHLIN, Ye. M. and KNUNYANTS, I. L., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Trialkoxyphosphonium ylides are formed when certain fluorinated alpha-oxides react with a trialkyl phosphite with the breaking of C-C and C-O bonds. Under the influence of oxides of olefins trialkyl phosphites usually either are oxidized or yield products of an Arbusov rearrangement.

At 0 to 5 °C, 8.0 g of $(EtO)_3P$ were added dropwise to 3.8 g of compound Ia, containing a COOEt radical. After 1 h at approximately 20 °C, 6.5 g of an unidentified low-stability compound were separated by distillation and 3.2 g (65 percent) of compound IIa, representing a phosphorylide with a COOEt radical. The latter had a boiling point of 130 to 132 °C at 0.01 mm. This compound has a formula of $C_{11}H_{20}F_3O_5P$, with 41.1 percent C, 6.36 percent H, 17.7 percent F and 9.4 percent P. Mass spectrum data (m/z) are as follows: 320, 237, 191, 171, 121, 93, 29. Ylide IIb, differing from IIa in that the COOEt radical is substituted by a CF_3 radical, was obtained from Ib, analogous to Ia, and $(EtO)_3P$. References 3: 2 Russian, 1 Western.
[62-8831]

UDC 542.952:546.22'131

MIGRATION OF THIONIC SULFUR ATOM IN PHOSPHORUS DIPHENOXYTHIOPHOSPHORYLIMIDOTRICHLORIDE, $(PhO)_2P(S)N{=}PCl_3$

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 11, Nov 81 (manuscript received 21 Sep 81) pp 2655-2656

KHODAK, A. A., GILYAROV, V. A. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] It has been demonstrated that the phosphorus diphenoxythiophosphorylimidotrichloride (I) is isomerized at 220 °C over 8 to 10 h into the diphenyl(dichlorothiophosphorylimido)chlorophosphate (II), $(PhO)_2P(S)N{=}PCl_3 \quad (PhO)_2ClP'{=}NP''(S)Cl_2$. The yield of II is 31 percent and it has a boiling point of 120 to 122 °C at 0.003 mm. This compound has a formula of $C_{12}H_{10}Cl_3NO_2P_2S$ and 14.9 percent phosphorus and 8.0 percent sulfur were found experimentally, with computed quantities of 15.4 percent phosphorus and 8.0 percent sulfur. Imidophosphate II was produced by the authors previously by another method (1981). Constants obtained by the two methods practically agree. References 3 (Russian).
[62-8831]

PESTICIDES

UDC 547.496.2

SYNTHESIS AND STUDY OF NEW ESTERS OF N-DITHIOCARBAMIC ACIDS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 81 (manuscript received 7 Apr 80) pp 26-28

MAKSUDOV, N. Kh. and SAFAYEV, M. A., Order of Labor's Red Banner Institute of Irrigation Engineering and Mechanization of Agriculture, Tashkent

[Abstract] New S-acetamide esters of N-dithiocarbamates were synthesized from chloracetopiperidine and sodium salts of N-dithiocarbamic acids. The products obtained were soluble in benzene, acetone, diethyl ether, alcohol and chloroform, but not in water. The composition and structure of the products were determined by element analysis and infra-red spectroscopy. The highest yield came in synthesizing piperidyl-N-dithiocarbamino-S-acetopiperidine. The most effective solvent was shown to be ethyl alcohol, as a polar solvent that promoted ionization. In all, 10 new derivatives of S-acetamide ethers of N-dithiocarbamates were obtained. References 6 (Russian,)
[84-12131]

UDC 548.737

CRYSTALLINE AND MOLECULAR STRUCTURES OF N-p-CHLOROPHENYL-N'-METHOXY-N'-METHYL-UREA AND N-p-CHLOROPHENYL-N'-HYDROXYUREA

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 22, No 5, Sep-Oct 81 (manuscript received 27 Jun 80) pp 111-115

NESTEROVA, Ya. M., PORAY-KOSHITS, M. A. and MOYEV, A. G., Moscow State University imeni M. V. Lomonosov; All-Union Scientific Research Institute for Chemical Plant Protection

[Abstract] X-ray structural analysis of the herbicide monolinuron (N-p-chlorophenyl-N'-methoxy-N'-methylurea; I) and its inactive precursor N-p-chlorophenyl-N'-hydroxyurea (II) revealed the crystals of the former to

be rhombic, and of the latter triclinic. In the case of I the bonds N(1)-C_6H_4Cl and N(2)-Me, and in II the bonds N(1)-C_6H_4Cl and N(2)-H(2), were cis-positioned with respect to the carbonyl group, while the oxygen atoms in both species were in the transposition (as in hydroxyurea) with respect to the C(1)-N(2) bond. Both molecules are nonplanar, but contain three planar regions: a) the p-chlorophenyl group, including the N(1) atom, b) the environment of atom N(1) (atoms C(2), N(1), H(1), C(1)), and c) the carbamide group involving atoms N(1), C(1), O(1), and N(2). Substitution of organic radicals for the H atom in the NH_2 group of the urea leads to disruption of the planar structure depending on the substituent: Ph results in retention of the trigonal coordination of atom N(1) and torsion of PhNH around the N(1)-C(1) bond, while Me and MeO alter the coordination of N(2) from trigonal to pyramidal, i.e., effect a transition from sp^2 to sp^3 hybridization. Figures 2; references 7: 3 Russian, 4 Western.
[75-12172]

UDC 542.97;547.546:547.556.3

SYNTHESIS OF ISOCYANATES BY CARBONYLATION OF AROMATIC NITROCOMPOUNDS, AZOBENZENE AND AZOXYBENZENE ON Pd-CATALYSTS CONTAINING Mo and V COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 12, Dec 81 (manuscript received 23 Apr 81) pp 2743-2746

LAPIDUS, A L., MANOV, YUVENSKIY, V. I. and PETROVSKIY, K. B., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Azocompounds are capable of reacting with CO to yield isocyanates both with and without carbonylation catalysts. The isocyanates can be formed by several routes: either by reduction of nitrocompounds to nitrene followed by carbonylation of the latter, or by carbonylation of azocompounds which are formed by two routes a) recombination of nitrenes or b) reduction of azoxy compounds. The goal of the present study was to clarify which of the two directions is realized under the conditions of CO carbonylation. The basic catalytic system for the synthesis of isocyanates consists of $PdCl_2$-pyridine (Py); in its presence isocyanates form easily from azobenzene (AB) and from nitrobenzene (NB). It was shown that addition of $Ca(VO_3)_2$ to the $PdCl_2$-Py system increases the conversion of NB 3-fold and decreases the conversion of AB practically to zero. It was shown that nitrocompounds convert to isocyanates over Pd catalysts containing V and Mo compounds, bypassing the stage of the azocompounds. Addition of $Ca(VO_3)_2$, $Al(VO_3)_2$, $Pb(VO_3)_2$, H_2MoO_4, $(NH_4)_2MoO_4$ and $CdMoO_4$ to the catalytic system promoted carbonylation of the nitrocompounds and inhibited conversion of azocompounds. References 14: 1 Russian, 13 Western.
[81-7813]

PRODUCTION OF CONSUMER GOODS AT ENTERPRISES OF USSR MINISTRY OF PETROLEUM REFINING AND PETROCHEMICAL INDUSTRY

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81
pp 3-5

AVDEYENKO, P. M., deputy minister, USSR Ministry of Petroleum Refining and the Petrochemical Industry

[Abstract] Plans were advanced by the communist party to increase consumer goods produced by the petroleum refining and petrochemical industry for the 11th Five-Year Plan. Enterprises of the ministry produced consumer goods and domestic appliances worth more than 870 million rubles in 1980. The range of articles produced by the industry includes detergents, bleaches, cleaning and finishing materials, cleaners for motor vehicles, carpet strips, rubber boats, sports ball cases, inflatable mattresses, hockey pucks and expanders. A number of articles were awarded the State Emblem of Quality. Promising plans for technical re-equipping of enterprises have been implemented to develop and assimilate new highly mechanized and automated production processes and to create modern raw materials. It is planned to expand the variety of goods and to replace those not in demand by the population. Attention is being devoted to increasing the efficiency of using raw materials, the technical level of production and the operational characteristics of articles to increase their service life and utilization efficiency. The loads acting on articles during operation, aging factors and other parameters will be calculated to save raw material and to create articles with high operational characteristics.
[152-6521]

UDC 678.7:621.892.099.6

PRODUCTION OF OILS THICKENED WITH COPOLYMERS OF ISOBUTYLENE AND DICYCLOPENTADIENE AND α-METHYLSTYRENE

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81 pp 8-10

AKHMEDOV, A. I., LEVSHINA, A. M. and SADYKHOV, Z. A., Institute of the Chemical Industry, Azerbaijan SSR Academy of Sciences

[Abstract] Copolymers of isobutylene and dicyclopentadiene and α-methylstyrene were synthesized to expand the variety of body additives in lubricating oils for cold climatic conditions. The viscosity index of thickened oils usually increases as the molecular mass of the additive increases. An additive of isobutylene and dicyclopentadiene copolymer additive with molecular mass of 10,000 had the best viscosity index of 130, congealing temperature of -54°C and decrease of viscosity during mechanical breakdown. An isobutylene and α-methylstyrene copolymer additive with molecular mass of 6,000 and 10,000 displayed similar properties with congealing point of -46°C and viscosity index of 128. Isobutylene and dicyclopentadiene copolymers improve the anticorrosion properties of oils when added at the rate of 1-2 percent to the oil. The copolymer additives also improve the low-temperature and depressor properties of lubricating oils. The synthesized copolymers can be used in both motor and transmission oils. References 6 (Russian).
[152-6521]

UDC 665.761.6

WHITE OIL PRODUCTION FROM WESTERN SIBERIAN PETROLEUM

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81 pp 10-13

VLASENKOV, L. A. (deceased), POTANINA, V. A., POPOVA, L. V., MARCHEVA, Ye. N. and RADCHENKO, K. A., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] The technology of producing white oils was investigated in multistage sulfonization of the initial raw material by oleum or gaseous sulphuranhydride [SO_3] with subsequent neutralization and contact prepurification. The use of gaseous sulphuranhydride instead of oleum has the advantage of lower consumption of the sulfonating agent, lower volume of acid tar formed and an increase of the yield of sulfonic acids which are used as a raw material to produce sulfonate additives. White oils are used to produce medical vaseline, perfume bases, a solvent of the ethylene polymerization reaction initiator, lubricating oil for high-pressure compressors and

as cable lubricant. The technology of producing a variety of white oils based on neutral oil from a mixture of low-sulphur Fergana and Turkmen oils from sulfonate additive production was developed to expand the raw material resources produced from other oil fields. The yield of low-soluble sulfonic acids increases as SO_3 consumption increases in sulphurization of the fourth oil fraction of Western Siberian oils. The yield of low-soluble sulfonic acids decreases as SO_3 consumption increases during sulphurization of neutral oil of first degree of sulphurization, while the yield of acid tar increases. White oil with a specific dispersion of 97 that tolerates the test for the presence of organic additives was produced by two-stage sulphurization with gaseous sulphuranhydride. Figures 2; references 9: 7 Russian, 1 East German, 1 Western.
[152-6521]

UDC 665.662.066.5

INDUSTRIAL TESTS OF ELECTRIC SEPARATING AGENTS IN DEHYDRATION OF DIESEL FUEL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81 pp 16-17

IDRISOVA, T. Sh., OBUKHOV, A. S., TELYASHEV, G. G., LANIN, P. A. and POKHITUN, L. Ye., NUNPZ

[Abstract] A single-stage process flow diagram was developed and introduced at NUNPZ for dehydration of diesel fuel on a combined installation using ERG-100 electric separators with plastic electrodes available at the plant that operated at temperatures up to 80°C and pressures no higher than 0.8 MPa. The process completely eliminated mechanical impurities in the fuel and reduced water content from 0.62 to 0.03 percent. Acidity was reduced from 1.54 to 1.51 and the filtration coefficient was reduced from 2.30 to 1.76 after passing through the electric separator. The effect of increasing temperature from 32 to 48°C to separate water from diesel fuel was investigated. Delivery of flushing water from 2 to 5 percent to diesel fuel does not increase the extent of dehydration in the raw material. The optimum parameters for dehydration of diesel fuel are fuel temperature no higher than 50°C, electric field intensity up to 2.5 kV/cm but not lower than 1.2 kV/cm. Figures 1.
[152-6521]

UDC 621.892:621.43

RELIABILITY OF MOTOR OIL AS COMPONENT OF ENGINE DESIGN

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81 pp 24-27

REZNIKOV, V. D., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] The reliability of motor oil as a component of engine design was considered with respect to the operating materials and the application of general concepts and indicators of reliability established by State Standard 13377-75 "Reliability in Engineering. Terms and Definitions." Motor oil is primarily regarded as an engineering object on the basis of general concepts of reliability theory and the appropriate terminology is introduced with respect to motor oils. The causes of oil failure were considered to obtain the most important information about the reliability and trouble-free operation of motor oils and methods of increasing the properties of the oils. Oil failure usually occurs gradually in an engine in proper working order. Sudden failure of oil is almost always related to failure or severe damage of some system of the engine such as the cooling or fuel system. It is proposed that a number of existing terms about the service life and changing of motor oil be changed to more accurately reflect the relationship of the oil to the engine service life. The indicators of motor oils that characterize trouble-free operation include viscosity, flashpoint, content of undissolved residue, alkaline number, pH, dispersability and water content. Recommendations are made that the initial values of oil quality indicators as well as the stability of oil properties during operation be included in the normative and technical documentation. Indicators of the efficient state of oil can be formulated and dependent and independent failures can be delineated by introducing the concept of the limiting state of oil and its failure. Figures 2; references 17: 8 Russian, 3 German (1 East German), 6 Western.
[152-6521]

UDC 336.5.003.13:665.003.13

IMPROVING WHOLESALE PRICES OF INDUSTRY FOR FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81 pp 27-31

ARTYUKHOVA, L. T. and DAVYDOV, B. N., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] The wholesale prices for products of the petroleum refining industry were reviewed and the realistic possibility of improving somewhat

the ratios between wholesale prices of the industry for individual types of fuels appeared on the basis of more complete consideration of the comparative effectiveness of their use by the consumer in the prices. The wholesale prices were reviewed with the condition that the level of existing prices for motor vehicle gasolines and diesel fuel be retained and that prices be increased for furnace mazut by an average of 51 percent. The minimum level of prices for various types of fuel below which the price cannot be established was calculated. The calculation showed a real need to increase the prices of industry for aviation gasolines, kerosenes, motor and gas turbine fuels and naval mazuts. It was recommended that the wholesale prices for motor fuel be established not below 56 rubles per ton so that production and sales would be profitable and that a ceiling price of 63.5 rubles per ton be established so that use of the fuel would be advantageous to the consumer. The prices for aviation gasolines and jet fuel were basically equalized by doubling the prices for jet fuel. This increase in prices stimulates efficient use of aviation gasolines and jet fuel in civil aviation and places an economic barrier in the path of inefficient use of jet fuel as a diluent of various grades of diesel fuels in winter. References 6 (Russian).
[152-6521]

UDC 665.61(476):665.61.03

NEW OILS OF BELORUSSIA AND BALTIC AREA

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81 pp 32-36

ZHMYKHOVA, N. M., DIRATSKAYA, Z. V., KRYLOVA, S. M. and TERESHINA, I. V., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] The new oil pools discovered in the Pripyat' Basin of Belorussia were investigated for their paraffin and sulphur content. Oil deposits under salt domes differ from those between salt domes by lower density and viscosity, sulphur content and resin-asphaltine compounds and higher yield of light distillates. The density and viscosity of oils, sulphur content in them and the resin-asphaltine compounds increase gradually in Rechitsko-Vishanskoye deposits as the distance from the Sosnovskoye fields increases. The new oil pools of the Baltic field are confined to ancient Paleozoic deposits of Ordovician and Cambrian age. The main fields are concentrated in the Kaliningrad bench and the Gargzhday outcrop in the Lithuanian SSR. The Baltic oils are characterized as light, low-sulphur, low-resin, high-paraffin and having high yield of light distillates. The fractions used as raw material for catalytic reforming are distinguished by high yield and low content of sulphur. Oils from the Baltic fields are used to produce high-index base oils.
[152-6521]

UDC 665.642.2:620.193

EFFECT OF RESINS ON PROTECTIVE PROPERTIES OF SHIP FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81
pp 36-38

OL'KOV, P. L., GORELOV, V. S., ROGACHEVA, O. I. and SYUNYAYEV, Z. I.,
UNI [expansion unknown; a petroleum institute]

[Abstract] The role of resins in providing protective properties to ship fuels was investigated by using distillates of different origin but identical fractional composition. The resins were separated from the distillates by the adsorption chromatography method on ASK silica gel and then introduced in different concentrations to de-resinated bases. The resins of all distillates have a specific protective effect and this effectiveness is determined to a significant degree by the nature of the distillates from which they were separated. The protective properties of narrow fractions of resins produced by sequential desorption of them from silica gel by solvents with increasing polarity were studied. The protective properties of the resin fractions increase as their adsorbability on the silica gel increases. The formation of water-soluble acid compounds decreases continuously as the resin content of the coking gas oil increases. The formation of water-soluble compounds reaches a minimum and then begins to increase as the content of resins of directly distilled origin increases. The hydrocarbons to which resins are added protect them against oxidation by interacting with the oxygen, being oxidized to different products. Minimum corrosion of metal corresponds to minimum formation of water-soluble acid compounds with low content of directly distilled resins. It is recommended that ship fuels be produced by compounding direct distillation distillates with gas-oil fractions of secondary origin. Figures 2; references 4 (Russian).
[152-6521]

UDC 678.66.094.38:678.048.21

EFFECT OF SILICON ESTERS ON THERMOOXIDATION STABILITY OF SYNTHETIC LUBRICATING OIL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 81
pp 50-51

ZEYNALOVA, G. A., NASIROVA, Ya. R. and KYAZIMOVA, N. S., Institute of the Chemical Industry, Azerbaijan SSR Academy of Sciences

[Abstract] Some nitrogen-, sulphur- and chlorine-containing esters of salicic acids were synthesized and their effect on oxidation of synthetic lubricating oil was investigated. The esters were synthesized by interaction

of phenyldinoneoxychlorosilane produced by partial esterification of phenyltrichlorosilane with nonyl alcohol, n-hydroxydiphenylamine, substituted phenols, thioglycol esters, xanthogenic acid, salicilic acid, hippuric acid and adipic acid. Dry benzine was used as the solvent and the reactions were conducted in the presence of basic compounds. All the esters were separated by distillation in a vacuum and are colorless or light-yellow oily fluids with the exception of one ester. The compounds synthesized in any quantity are easily dissolved in pentaerithrite ester. The most effective antioxidants among alkylated phenols are spatially arranged phenols which have tert-butyl radicals in the positions ortho to the hydroxyl group. References 6: 2 Russian, 4 Western.
[152-6521]

UDC 665.656.4+665.65.003

EXPERIENCE OF OPERATING LI-150V ISOMERIZATION PLANTS AND METHODS OF INCREASING THEIR EFFICIENCY

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 81 pp 15-18

BURSIAN, N. R., VOLNUKHINA, N. K., KISELEVA, E. A., LASTOVKIN, G. A. and SMIRNOVA, M. A., "Lenneftekhim" Scientific Production Association

[Abstract] The operating indicators of gasoline fraction isomerization plants were analyzed for the period of 1972-1979 at the Moscow Petroleum Refining Plant and at the "Yaroslavnefteorgsintez" Production Association. Indicators of the quality of refined gasoline fractions and pentane fractions, which is the raw material of the isomerization unit, indicators of the isomerization process on the IP-62 catalyst and engineering and economic indicators corresponded as a whole to the planned indicators and in some cases exceeded them. The quality of the initial raw material of the plant and that of the isomerization unit, including the hydrocarbon composition and sulphur content, affected the operating efficiency of the plant. Specific reserves were determined both in the technology of the process and in the operation of some types of equipment. Recommendations were made for intensifying the operation of the plant to increase the operating efficiency. Approximately 580,000 rubles per plant will be saved from implementation of the proposed measures. Figures 3; references 7 (Russian).
[78-6521]

UDC 547.29.295.2

PROTECTIVE FUEL ADDITIVE FOR SHIP GAS-TURBINE ENGINES

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 81
pp 25-26

DUDUKIN, L. S., LEDENEVA, T. A., OZEROV, Ye. A., SEREGIN, Ye. P.,
PETROV, V. I., KOSOBOKOVA, E. M., AVETISYAN, A. A. and GUBANOVA, V. A.,
All-Union Institute of Heat Engineering imeni Dzerzhinskiy; Berdyansk
ONMZ [expansion unknown--metallurgical plant]

[Abstract] Use of diesel fuels (DT) containing vanadium leads to high temperature corrosion of structural heat-resistant alloys used in manufacture of ship gas turbine engines. The effect of a new magnesium fuel additive was investigated to determine the reliability and operating life of the engine. The magnesium additive based on a fraction of synthetic fatty acids C_5-C_6 proved effective in reducing gaseous corrosion. Bench and full-scale tests of DT fuel with the new additive indicated that the new additive is somewhat superior to magnesium naphthanate additive in reducing gaseous corrosion of alloys and the number of deposits formed and also ease of removing the deposits from the turbine blades. Deposits of ash components of fuel and additive in the flow-through part of the gas turbine engine were insignificant and were removed by ordinary flushing. References 7: 5 Russian, 2 Western.
[78-6521]

UDC 630*863.4:661.725.81

ECONOMIC PREREQUISITES FOR ORGANIZING XYLITE PRODUCTION FROM DECIDUOUS TREES

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian
No 8, 1981 (signed to press 25 Nov 81) pp 4-5

KAMENKOVICH, Yu. M., LEYKIN, Ye. R. and SEMANOVA, A. G., All-Union Scientific Research Institute of Protein Synthesis

[Abstract] The production of xylite from deciduous trees, primarily birch trees, was investigated to eliminate the shortage of crystalline xylite in the national economy. It has also been impossible to solve the problem by using only cotton pods and corncobs as the raw material. It is recommended that xylite production from deciduous trees be developed at accelerated rates. The cost of crystalline xylite production from birch trees is approximately 1,600-1,900 rubles per ton and the increased cost is explained by the rather high wholesale price for the raw material. Satisfying the needs of the population and also of industry for crystalline xylite is seen as the main factor rather than the price for the raw material. There will also be a saving when the xylite shortage is relieved: the available xylite is used to improve the condition of diabetes patients, and thus increases their efficiency and their contribution to social production, thereby reducing expenditures for social insurance. References 3 (Russian).
[61-6521]

POLYMERS AND POLYMERIZATION

UDC 541.64:547.241

COPOLYMERIZATION OF UNSATURATED ORGANOPHOSPHORUS MONOMERS

Moscow USPEKHI KHIMII in Russian Vol 50, No 9, Sep 81 pp 1653-1677

SHULYNDIN, S. V., LEVIN, Ya. A. and IVANOV, B. Ye., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The current state of copolymerization of unsaturated phosphorus-containing monomers was investigated for the vinyl group, diene group, in the β- and γ- positions to the vinyl group and separated from the vinyl group. Quantitative data were generalized and analyzed with respect to reactivity during radical copolymerization. The position of the monomers among other types of unsaturated compounds was determined; organophorphorus monomers that can be used to modify polymer materials by copolymerization were studied among other types of unsaturated compounds. Both the rate of the process and the molecular mass of the resulting products, as well as the composition of the copolymers and the properties of polymers can be changed in the desired direction by altering the nature and structure of organophosphorus monomers. Figures 1; references 132: 95 Russian, 37 Western.
[17-6521]

UDC 542.952.6+546.18+547.315.2

POLYMERIZATION AND COPOLYMERIZATION OF DIETHYL 3-CHLORO-1,3-BUTADIENEPHOSPHONATE WITH STYRENE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 9, Sep 81 (manuscript received 1 Jun 81) pp 786-789

LULUKYAN, R. K., ARAKELYAN, R. A., OVAKIMYAN, M. Zh., DURGARYAN, A. A. and INDZHIKYAN, M. G., Institute of Organic Chemistry, Armenian SSR Academy of Sciences, Yerevan

[Abstract] Diethyl 3-chloro-1,3-butadienephosphonate was polymerized and copolymerized with styrene in the presence of azo-α,α-bis-isobutyric acid dinitrile. There were no absorption bands at 929 and 3,110 cm^{-1} in the

infrared spectrum of the polymer that are typical for a final vinyl group or at 1,576 and 1,620 cm^{-1}, inherent to the conjugated diene grouping of the initial monomer. There was absorption in the 1,650 cm^{-1} band typical for a di-substituted double bond. These data indicate occurrence of radical polymerization at the 1,4 position of the dienephosphonate. Copolymerization constants equal to 0.22 and 0.62 were determined graphically by using the integral equation of the copolymer composition. Both the polymer and copolymer were soluble in chloroform, carbon tetrachloride and acetone and were insoluble in hexane and ether. Figures 1; references 5: 4 Russian, 1 Western.
[18-6521]

INDUSTRIES FOR PLASTICS MATERIALS AND THEIR MANUFACTURE FOR PAST 50 YEARS

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 81 pp 3-6

VLASKIN, Ye. F., assistant minister for the chemical industry

[Abstract] A brief history of the plastics industry is presented by noting the major achievements of each of the ten five-year plans. For the 1st Five-Year Plan (1928-1943), the volume of synthetic resins and polymers increased 10 fold (to 3100 tons). From 1933-1937, production increased about 5 fold and product assortment was enlarged considerably. From 1938-1942, the product assortment continued to increase, new plants were constructed and existing plants enlarged and refurbished. From 1943-1945, scientific research institutes for plastics were established in Moscow and Leningrad. During the next two five-year plans (1946-1955), factories were designed and built to produce viniplast, carbamide resins and aminoplast, cable materials, PVC films, polystyrol, vinylacetate, polyvinylbutyral, ion exchange resins, and many other products. The years from 1956-1965 emphasized the development of national resources. Resin volume increased from 237,500 tons to 801,500 tons as did development of high density polyethylene, shock-resistant polystyrol, and styrol copolymers, organosilicon resins, condensed ion exchange resins, polyamides and others. After 1965, both the rate of development of new resin products and the production of resin materials accelerated rapidly. From 1966-1975, the resin volume increased 3.5 fold to 2.841 million tons in 1975 and to 3.6 million tons in 1980. The volume of manufactured goods increased 3.6 fold to 894,000 tons in 1975 and to 1.2 million tons in 1980. The Academy of sciences and its affiliated branches have played a large role in the development of many of the new products.
[153-12027]

UDC 678.065.5:678.046.364:543.874

FIBERGLASS CONSTRUCTION PLASTICS

Moscos PLASTICHESKIYE MASSY in Russian No 8, Aug 81 pp 49-50

AVRASIN, Ya. D., MARTYNKINA, L. F., BYKOVA, L. V., and MIKHAYLOVA, Z. V.

[Abstract] A study was made of the properties of fiberglass resins based on chlorinated styrol resins of the type PN-6M, phosphorylated polyester-acrylate resins of the types NPS-609-27 and NPS-609-30, and both chlorinated and phosphorylated polyestermaleinate resins of the type PN-63. Hardening agents evaluated were giperiz+NK-2, methylethyl ketone peroxide (MEKP) + NK-2, MEKP + accelerator "B", and giperiz + LKT-3. Best results with respect to working life and hardness were obtained with the latter. The kinetics of the hardening reaction were studied at temperatures of 20-140°C using a torsiometer. Times of initiation of hardening and attainment of ultimate hardenss for the five temperatures are as follows: 20°C, no curing; 80°C, 30 min. 30 min.; 100°C, 7 min., 6 hrs.; 120°C, 5 min., 4 hrs.; and 140°C, 1 min, rapid. An evaluation of the effect of molding pressure on fiberglass plastics cured at 100°C for 1.5 hrs. indicates that, with increasing the press pressures from 0.35 to 1 MPa, the breaking point during flexing increases. The decrease in binding at higher pressures may reduce the water resistance of the plastic, and degrade its technological properties; hence, the optimum pressures are probably in the range 0.35 to 0.7 MPa. Figures 3; references 5 (Russian).
[153-12027]

UDC 678.5.067.5.01:539.3

BEHAVIOR OF GLASS FIBER REINFORCED PLASTICS UNDER PULSED LOADS

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81 pp 22-23

RYBIN, A. A. and GLUKHOV, L. V.

[Abstract] The effect of the type of fabric filler on the behavior of glass fiber reinforced plastic under shock compression was investigated at a deformation rate of 48.0 s^{-1}. The mechanical properties of the plastics were characterized by tensile impact stress, previous breakdown energy and breakdown development energy. The oscillographic method was used to describe the force and energy characteristics of the specimens. The two main groups of plastics tested included specimens based on T-1, satin and cord braiding materials in the first group and less dense braiding materials in the second group. The optimum filler content for specimens subjected to static and dynamic loading was approximately 80 percent for the first group of materials and approximately 60 percent for the second group. The binder played a greater role in formation of mechanical properties in the

second group than in materials of the first group based on fabric with increased density. Figures 1; references 3 (Russian).
[56-6521]

UDC 678.065.5]02

MANUFACTURE BY IMPREGNATION UNDER PRESSURE OF LARGE GLASS FIBER REINFORCED PLASTIC ARTICLES BASED ON MULTIPLY FIBERGLASS

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81 pp 34-36

SPORTSMEN, V. N., GURTOVNIK, I. G. and PYAYEV, V. L.

[Abstract] The characteristic features of manufacturing large glass fiber-reinforced plastic articles based on MTBS-4.35 and ITM-2.85 multiply fabrics were investigated with respect to the strength, stiffness and airtightness of the male and female molds and creation of the required vacuum in the working cavity. The reinforcing material is uniformly impregnated with binder within a specific time according to the number, dimensions and arrangement of the delivery and drain connecting pipes. The binder in the glass fiber-reinforced plastic is initially treated for hardening on microspecimens by the torsion pendulum and infrared spectroscopy methods according to the degree of transformation of the epoxide groups. The hardening conditions are then refined according to the physicomechanical and dielectric characteristics of flat panels. A stepped mode of 5 hours at 100°C, 2.5 hours at 120°C, 1 hour at 140°C and 1.5 hours at 160°C for EDT-10 binder was optimum and mode of 3 hours at 100°C, 2 hours at 120°C and 8 hours at 160°C was optimum for SPE-24 binder. Hardening conditions for the article under consideration were 3.0-3.5 hours heating from 60 to 200°C, raising temperature to 140°C and holding for 3 hours, raising temperature to 200°C and holding for 5 hours, reducing temperature to 170°C and holding for 2 hours and cooling to room temperature. Figures 2; references 5 (Russian).
[56-6521]

UDC 678.743.21-278]02

EFFECT OF ATMOSPHERIC HUMIDITY ON FORMATION AND PROPERTIES OF POROUS POLYVINYL CHLORIDE MEMBRANES

Moscow PLASTICHESKIYE MASSY in Russian No 11, Nov 81 pp 39-41

NACHINKIN, O. I., RUBAN, I. G., VASIL'YEVA, A. A., DUDROVA, A. G., GUSEVA, L. Ya. and VASIL'YEVA, G. N.

[Abstract] The specific processes of evaporation and syneretic separation of solvent in production of porous polyvinyl chloride membranes was considered

under conditions of specific relative atmospheric humidity in the shaping zone. The solvent used in the experiments was chemically pure dimethylformamide. Three series of experiments were conducted: only the role of cooling of the solution to a temperature of 10-12°C below coagulation temperature was determined in the first series, conditions were created in the second series for evaporation of the solvent from the polymer solution with isolation of it from air moisture by filling the free space with nitrogen and the effect of the relative atmospheric humidity on the process of separation of the polymer solution into phases and also on the properties of the membranes was studied in the third series. The coagulation time decreases as humidity increases with an increase of the amount of syneresing fluid and polymer content in the coagulate. Syneresis of the coagulant is observed within several minutes after the system coagulates and is described by a curve with minimum in the range of relative humidity of 45-60 percent. The change in time to the beginning of syneresis is related to a decrease of mobility of the polymer solution in the surface layer at humidity of 60 percent. Convective cross-linking of the polymer solution with the absorbed water changes to diffuse transport of water inside the film as a result. Figures 3; references 2: 1 Russian, 1 Western.
[56-6521]

UDC 541.64:537.311

SEMICONDUCTOR PYROPOLYMERS

Moscow USPEKHI KHIMII in Russian Vol 50, No 11, Nov 81 pp 2106-2131

MAGRUPOV, M. A., Tashkent State University

[Abstract] This is a survey-type report limited to reports of data on the structure, electrophysical and paramagnetic properties which are needed to construct a concrete model of the structure of the semiconductor pyropolymers. Structural models are presented for the title compounds in order to elucidate the effect of structure on the electric and paramagnetic properties. These materials are treated as microheterogeneous systems composed of areas having good electrical conductivity separated by barriers. This theoretical description is used as a basis for considering the origin of the paramagnetic domains and also for evaluating the thermodynamic efficiencies. Charge transfer is analyzed from the standpoint of the theory of electronic states of disordered systems. The temperature relationship of the electrical conductivity over a wide temperature range follows the Mott equation. Quantitative relationships are given which characterize the electrical parameters of the powdered pyropolymers as a function of pressure and the number of paramagnetic centers as a function of electrical conductivity. Figures 11; references 103: 87 Russian, 16 Western.
[64-12027]

UDC 546.04'723'824'7'47'623'34

THERMAL STABILITY OF FILLED POLYORGANOSILOXANES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 47, No 12, Dec 81 (manuscript received 5 Feb 80) pp 1243-1249

TERLIKOVSKIY, Ye. V., SIMUROV, V. V., and KRUGLITSKIY, N. N., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences

[Abstract] High temperature effects were studied on a number of protective coatings based on modified clay minerals, mountain cork and montmorillonite, used in organosilicon lacquers. These were applied as coatings with thicknesses of 80-100 mkm, and structural and spectral changes were studied. Results showed that the coatings with montmorillonite had the greatest thermal oxidation stability. Various standard and modified lacquers were subjected to differential thermal analysis, and data on results are presented. Infra-red spectral comparison of all tested compositions indicated increased intensity of integral absorption in the band of antisymmetrical valent oscillations of siloxane bonds after prolonged thermal processing, which was explained by condensation processes of silanol polymer groups bringing increased numbers of siloxane bonds. This confirmed the increased thermal oxidation stability after preliminary thermal processing. Figures 6; references 10: 9 Russian, 1 German.
[73-12131]

RADIATION CHEMISTRY

UDC 541.15:541.124.7.546.22.161

CHEMICAL CASCADING AND TARGET ISOTOPE ACQUISITION BY LASER SEPARATION OF CARBON ISOTOPES

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSSR in Russian Vol 98, No 1, Apr 80 (manuscript received 22 Nov 79) pp 93-96

[Article by T. G. Abzianidze, A. V. Baklanov, A. S. Yegiazarov, A. K. Petrov and Yu. N. Samsonov, Scientific Research Institute of Stable Isotopes and USSR Academy of Sciences Institute of Chemical Kinetics and Combustion]

[Text] Selective dissociation of molecules by the action of CO_2 laser pulses for the purposes of isotope separation has become a problem that is regularly addressed in physics (1,2). The chemical aspects of this problem have been studied as well (3). However, even at sufficiently high coefficients of selective dissociation, one enrichment cycle is found to be not enough, and so in each concrete case we are compelled to study the possibilities of cascading the process and acquiring the target product.

We conducted such research with the CF_3Br molecule, the isotope selective dissociation of which has already been studied in detail (4).

CF_3Br molecules were decomposed in the field of a pulsed CO_2 laser,

$$(0) \qquad CF_3Br \xrightarrow{K_0} CF_3 + Br$$

with C_2F_6 and Br_2 being the end products. Inasmuch as C_2F_6 molecules do not have an absorption band within the emission range of a CO_2 laser, and because chemical transformation of such molecules into CF_3Br is a rather complex problem, we dissociated CF_3Br in the presence of HBr and NO, serving as CF_3 radical acceptors, in order to obtain CF_3H and CF_3NO.

The experiments were run with a pulsed CO_2 laser (5) with energy ≈1 j and $\tau_p=10^{-7}$ sec at an emission frequency of 1,078 cm^{-1}. The emissions were focused into a glass cuvette ($d = 40$ mm, $l = 100$ mm) with windows made from KBr. The CF_3Br pressure was 1 tor, and the pressure of the acceptors was varied.

A UR-20 spectrophotometer was used to analyze the products on the basis of their IR absorption spectrums. Figure 1 shows growth in the relative concentration of CF_3H and a decrease in the concentration of C_2F_6 as the pressure of HBr increases.

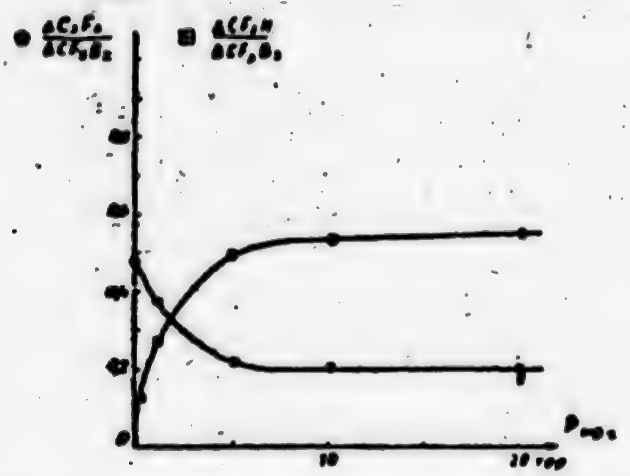

Figure 1. Dependence of Relative Concentrations of CF_3H and C_2F_6 on Pressure of HBr: □ --CF_3H; o--C_2F_6

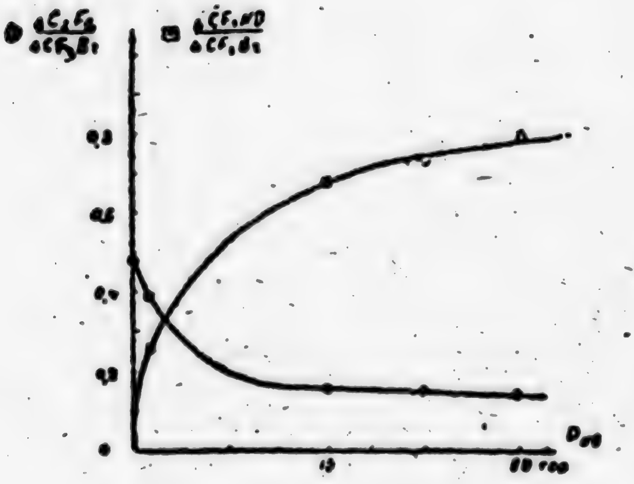

Figure 2. Dependence of Relative Concentrations of CF_3NO and C_2F_6 on Pressure of NO: □ --CF_3NO; o--C_2F_6

Before addition of acceptors, dissociation constant K_o, obtained from the relationship $P = P_o \cdot e^{-kn}$, where n is the number of pulses (6), is $2 \cdot 10^{-4}$/pulse. When 10 tor HBr are added, this value increases to $4 \cdot 10^{-4}$/pulse, but at reasonable concentrations

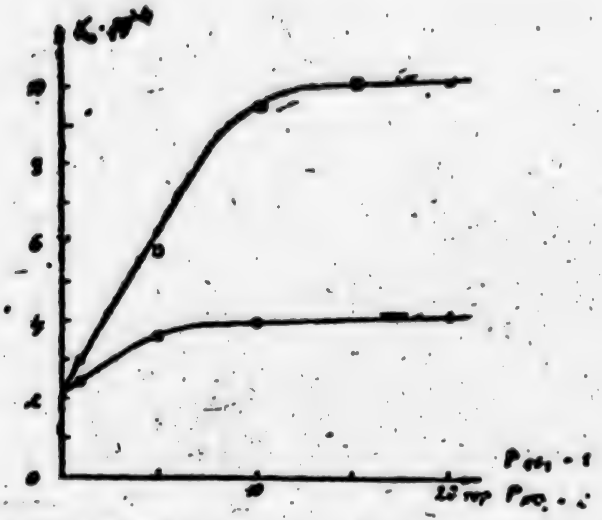

Figure 3. Dependence of Dissociation Rate Constants for CF$_3$Br on Pressure of Acceptor: o--HBr; □--NO

of HBr, formation of C_2F_6 cannot be avoided. This is consistent with the kinetic constants for the reaction rates:

$$(1)\qquad CF_3 + CF_3 \xrightarrow{K_1} C_2F_6 \qquad K_1 = 10^{\text{[illegible]}}{}^*, \qquad [7]$$

$$(2)\qquad CF_3 + HBr \xrightarrow{K_2} CF_3H + Br \qquad K_2 = 10^{8.7}. \qquad [5]$$

When NO is added (Figure 2), formation of C_2F_6 may be avoided practically completely. In this case the main products are CF_3NO and BrNO, obtained by the following reactions:

$$(3)\qquad CF_3 + NO \xrightarrow{K_3} CF_3NO. \qquad K_3 \geq 10^{11.64}, \qquad [8]$$

$$(4)\qquad Br + NO \xrightarrow{K_4} BrNO.$$

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*These and other rate constants are given for 300°K.

The size of K_0 (Figure 3) reaches 10^{-3}/pulse, which may be explained by strong competition of reactions (3) and (4) with the reverse reactions:

$$(5) \quad CF_3 + Br \xrightarrow{K_5} CF_3Br, \qquad K_5 = 10^{13.07}, \quad [7]$$

$$(6) \quad CF_3 + Br_2 \xrightarrow{K_6} CF_3Br + \dot{B}r. \qquad K_6 = 10^{11.84}. \quad [8]$$

Reduction of the rates of reactions (5) and (6) should increase the final selectivity of the process. As far as CF_3NO is concerned, this product is easily brominated as follows:

$$(7) \quad CF_3NO + Br_2 \xrightarrow{K_7} CF_3Br + BrNO.$$

When CF_3NO is heated to 200°C in the presence of excess Br_2, a quantitative yield of CF_3Br is obtained in several minutes. This makes it possible to carry out another enrichment step, and so on.

Thus we have basically demonstrated a simple means of cascading and obtaining a target product by laser separation of carbon isotopes. Moreover the studied laser-chemical reaction between CF_3Br and NO can apparently be used to synthesize CF_3NO.

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11004
CSO: 8144/0658

WATER TREATMENT

UDC 543.31

DEVELOPMENT OF WATER ANALYSIS METHODS IN 1980

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 6, Nov-Dec 81
(manuscript received 2 Jul 81) pp 495-521

PILIPENKO, A. T. and TERLETSKAYA, A. V., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Domestic and foreign research on natural and pollutant components of water is reviewed. Standards (maximum permissible levels) have not yet been determined for the approximately 640 components found in water for human consumption and this remains one of the tasks to be addressed by water scientists. The survey of literature begins with the procedures to identify inorganic substances by such methods as concentration and atomic absorption processes, emission photometry and other photometric procedures, dialysis and electronic filtration, extraction concentration and separation, etc. Procedures for identifying organic substances seek to develop a systematic process that would include all substances. The best results have been realized when separation and concentration processes using organic polymer sorbents were applied, followed by various types of chemical analysis. Gel-filtration for dissolved organic substances offers further promise, and inert gas fixing procedures are highlighted for their sensitivity, replicability and simplicity. Substances identified include synthetic organic compounds, such as phenols, polynuclear aromatic hydrocarbons, surface-active substances, pesticides and compounds containing halogens. References 381: 92 Russian, 2 Romanian, 1 Polish, 286 Western.
[82-12131]

UDC 628.543:547

ELECTROCHEMICAL PURIFICATION OF MINERALIZED SEWAGE TO REMOVE ORGANIC IMPURITIES

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 6, Nov-Dec 81 (manuscript received 20 Jan 81) pp 525-526

ZYABLITSEVA, M. P., KONOVALOV, M. B., TYURIN, B. K. and SMIRNOV, V. A., State Scientific Research Institute for Chlorine Projects

[Abstract] Electrochemical purification was conducted in a thermostatically controlled electrolyzer equipped with ruthenium oxide anodes on a titanium base and with titanium cathodes. Both experimental and actual sewage was purified, using nickel-cobalt catalysts of high valence. The parameters in the electrolysis were determined on the basis of the type and quantities of impurities to be removed, with organic gaseous compounds being identified by a chromato-mass-spectrometry method and quantities determined using gas-adsorption chromatography. At least 90% of the impurities were removed, with practically no active chlorine remaining, and organic carbon and chlorate levels not surpassing 0.30 kg/m^3. Various acids and salts of the carboxyl group were found as expected. The cost per cubic meter was 1-1.5 rubles, and useful by-products were obtained. Figures 1; references 8 (Russian).
[82-12131]

UDC 541.182.65:537.363

REMOVAL OF BACTERIA FROM WATER IN ELECTRODIALYZERS WITH SHORT INTERMEMBRANE DISTANCE

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 81 (manuscript received 10 Mar 81) pp 48-51

KUL'SKIY, L. A., academician, UkSSR Academy of Sciences, GREBENYUK, V. D., SAVLUK, O. S. and LYSENKO, L. V., Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] The removal of bacterial flora from water was studied by using an electrodialyzer with short distance between membranes controlled by a spacer in the form of dielectric wires. The viscous flow stresses of the fluid directed along the chamber and the electrophoretic component directed perpendicular to the flow act on the suspended particles in the slotted chamber of the electrodialyzer. Removal of bacteria is optimum at voltage of 40 V in the apparatus and flow rates of 0.2 and 0.9 cm/s. The effect of decontamination decreases with an increase of flow rate. The minimum

electric power consumption at which an antimicrobial effect is achieved at water flow rate 1.2 liters/hr·dm^2 of paired membranes is 10 W·hr/liter. The retained microorganisms are flushed out by the liquid flow and the apparatus is regenerated if the electric field intensity fluctuates. Figures 4; references 6: 5 Russian, 1 Western.
[22-6521]

UDC 546.19+541.8-165

SOLUBILITY OF ARSENIC-CONTAINING PRECIPITATES BASED ON HYDROXYLAPATITE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 9, Sep 81 (manuscript received 28 Jan 80) pp 2122-2124

GRIGOR'YEV, Yu. O, PUSHKAREV, V. V. and PUSTOVALOV, N. N., Ural Polytechnic Institute imeni S. M. Kirov

[Abstract] The solubility of precipitates based on hydroxylapatite containing tri- and pentavalent arsenic was investigated. The solubility of the precipitates did not exceed 0.05 mg/liter for arsenic based on hydroxylapatite containing pentavalent arsenic and aged in the mother liquor for more than 35-40 days in the pH range of 7.0-12.0 with equilibrium calcium concentration of 200 mg/liter. The solubility of the precipitate increases sharply if the trivalent arsenic content in the precipitate is increased. The solubility of the precipitate decreases with respect to arsenic if the pH value of the solution is increased. The lower the percentage of trivalent arsenic in the precipitate, the more sharply its solubility decreases. Precipitates based on hydroxylapatite obtained from treatment of industrial wastewater and containing pentavalent arsenic can be stored in simple natural reservoirs. Figures 2; references 3 (Russian).
[16-6521]

UDC 630*863:628.3

BASIC PRINCIPLES OF DEVELOPING NONDRAINAGE TECHNOLOGY OF HYDROLYSIS PLANTS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 8, 1981 (signed to press 25 Nov 81) pp 1-3

BRYZGALOV, L. I., engineer, All-Union Scientific Research Institute of Hydrolysis

[Abstract] Methods of reducing to a minimum water consumption and runoff as a whole and especially for main production at hydrolysis enterprises were studied to develop and supplement a closed production cycle and to determine available reserves. The recirculating water supply system was

studied as one of these facilities to achieve maximum water supply from the system and minimum water consumption to supplement nonreturnable losses of the system. A considerable amount of water used in the recirculating water supply system is contaminated with slight quantities of mainly organic substances that are suspended and dissolved and that include lignin, furfurol and organic acids. Discharge of waste water into the runoff reservoir of the main plant can be avoided by recirculating production water and using it with proper treatment to cultivate yeasts. The specific consumption of water from the source can be reduced up to 5.1 m^3/ton and losses of useful products such as yeasts and furfurol can be eliminated or reduced to a minimum. A nondrainage main production system is seen as the first step in developing a nondrainage scheme for the entire enterprise.
References 4 (Russian).
[61-6521]

UDC 630*863:628.54

USING INCOMPLETELY PURIFIED WASTE WATERS OF HYDROLYSIS ENTERPRISES TO IRRIGATE FIELDS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 8, 1981 (signed to press 25 Nov 81) pp 5-6

SHCHERBAKOV, A. S. and ZAKHARTSOVA, L. M., "Progress" All-Union Scientific Production Association for Agricultural Use of Waste Waters

[Abstract] The use of waste waters to irrigate agricultural lands was investigated as one of the effective methods of prepurification and of protecting water resources against pollutants. Essentially complete prepurification of the water is achieved and additional agricultural products are produced from using it with this method. A handbook on use of waste waters of the hydrolysis industry to irrigate agricultural crops has been published and is used as agency construction norms of the Ministry of Reclamation and Water Management in the USSR. The maximum chemical content of waters is defined in the handbook as a function of the soil on which the water is used. It is recommended that the use of waste water be coordinated with sanitary inspection organizations and organizations to regulate the use and protection of water before the waste water is used for irrigation. Construction of irrigation systems using waste waters of hydrolysis plants is more feasible than purification or prepurification at industrial purification plants.
[61-6521]

MISCELLANEOUS

UDC 541.182.42;678.021.122:532.783.004.3

INVESTIGATING STABILITY OF DISPERSIONS OF MICROENCAPSULATED LIQUID CRYSTALS

Ivanovo IZVESITYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 9, Sep 81 (manuscript received 8 Jul 80) pp 1110-1112

ZHELEZNOV, K. N., KLOPOV, V. I. and INDEYKIN, Ye. A., Chair of Inorganic Chemistry, Ivanovo State University, Ivanovo Chemical Engineering Institute and Yaroslavl' Polytechnical Institute

[Abstract] The effect of the length of formation of the coacervate shell on the electrophoretic mobility of microcapsules of liquid crystals and the pH of their aqueous dispersions was investigated. Electrophoretic mobility decreases as the acidity of the medium increases and it corresponds to negative values of the electrokinetic potential over the entire range of investigation. Maximum values of pH should be achieved when producing stable dispersions of liquid crystal microcapsules. The kinetics of coagulation corresponding to minimum pH and to minimum value of isoelectric potential essentially corresponds to the kinetics of rapid coagulation. An increase of pH and an increase of electrokinetic potential considerably retards the process of coagulation. Figures 4; references 6: 2 Russian, 4 Western.
[36-6521]

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